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An Announcement

CAPITALISM, which is the root-essence of all this country's industrial institutions, is today under attack from many sections of the world. Therefore, more than ever, it is necessary for capitalism to become fully conscious of the basic economic laws of good housekeeping in order that its role in production and distribution in no way be stultified.

With this in mind, THE IRON AGE has secured the services of Joseph Stagg Lawrence, who will henceforth write the weekly editorials to appear in this space. Mr. Lawrence is economist and vice-president of the Empire Trust Co., New York, member of the board of directors and executive committee of General Reinsurance Corp. and North Star Reinsurance Corp., Director of First York Corp., head of the Investment Counsel Department of the Empire Trust Co., Fellow of the Brookings Institution, author of five books in the field of money and banking, former editor of *Bradstreets*, former associate editor of *World's Work* and *Review of Reviews*, formerly on the faculty of Princeton University as a specialist in money and banking.

Mr. Lawrence fully understands the role of money in present-day affairs. He combines a practical job in the world of business with literary competence and a profound understanding of political and economic forces. He has been called the "Walter Lippmann of Economics;" he has a deeply analytical mind and his authorship of the monthly Empire Trust Letter has enhanced his reputation as an authority in the field of business.

THE IRON AGE welcomes Mr. Lawrence to this page next week. We are sure that the thousands of readers of this page will find his views stimulating and provocative.

T. W. Lippert

► The construction industry will have to compete with the oil and gas industries for some time to come for available supplies of steel plate. Backlogs for line pipe are at a new high, and the steel plate situation is not expected to ease for some time.

► Some old established steel warehouses are loath to supply their customers with steel for which they have paid premium prices. They say that even if the bills are all shown to the customers some of the latter have a far-away look in their eyes--probably meaning "I see it, but it isn't true."

► A grinding wheel cooling system has been developed that incorporates feeding 1 to 4 drops per sec of coolant through the spindle into the wheel, where centrifugal force drives it to the work point. Temperatures are held several hundred degrees below those found in other wet grinding systems.

► At the current rate of construction it would take over 100 years to rebuild England. Bricklayers are laying 400 bricks per day, compared with 1000 per day prewar, and 2000 per day some years ago.

► In 7 years' experience in union participation in establishing time study methods, a Pittsburgh company reports only one case not settled by mutual agreement.

► Latest chapter in aluminum substitution for steel is in pipe. Warehousers have in many cases despaired of getting steel pipe and are selling large amounts of aluminum pipe. Users report that on the average per foot basis the aluminum is twice as expensive, but on a pound basis the aluminum averages 25 pct cheaper.

► A salt bath treatment developed by A. F. Holden Co. operates with the electrical power and the elements, or electrodes, at a much lower temperature than the liquid being heated.

Economical advantages are realized by way of a 25 pct reduction in radiation losses, and an elimination of power transmission losses usually encountered in conventional furnaces. Construction details are such that electrodes are entirely removed from the working area of the pot.

► The first case of a large maker of barbed wire offering this item above published mill prices was reported last week in Chicago. The Iron Age was informed that a total of 400 tons of standard galvanized barbed wire would be available during the first quarter at $200 a net ton f.o.b. mill, if the purchaser was interested. This price was only guaranteed up to and including Feb. 15.

► British steelmakers Guest, Keen & Nettlefolds and John Lysaght Ltd., are preparing to spend $35 millions on the expansion of steel production, particularly flat rolled products, in Australia.

► Practical economists are predicting a broad price readjustment period next year. They point to the tightening of credit and the availability of money for capital investment. Rates are still low, but it is now tougher to get the money. Few of the prognosticators are willing to predict a serious depression in the near future...most are prefacing their statements with..."now it might not happen this way at all."

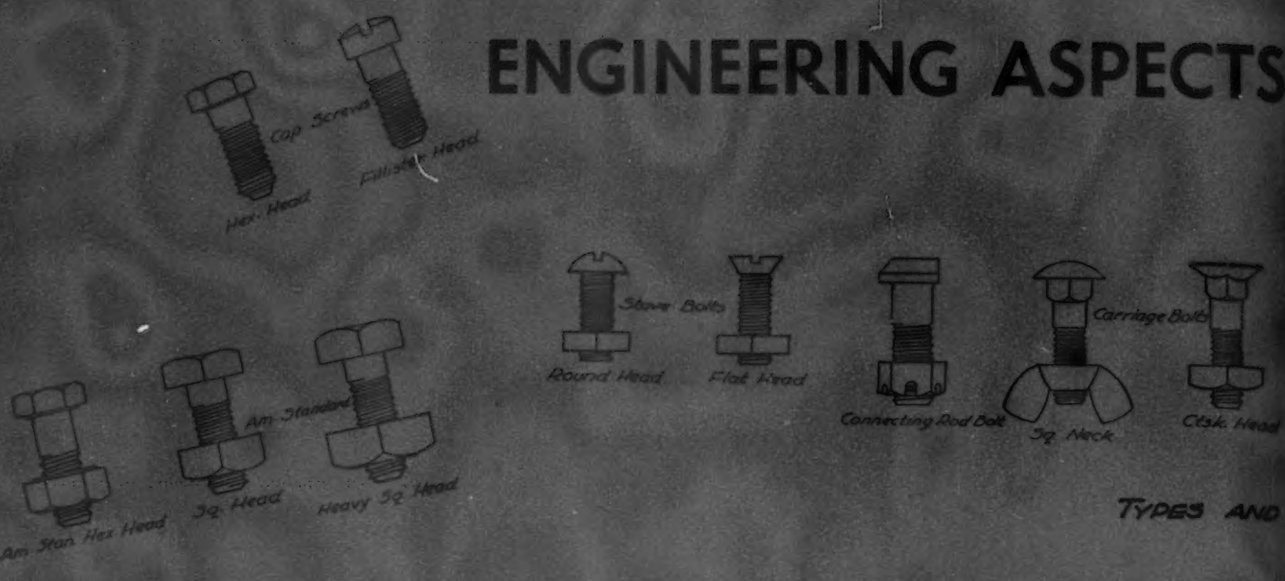
► Cupola operations with oxygen-enriched blast hold little promise of immediate commercial significance, recent experimental runs indicate. A trial run on a 20-ton per hr cupola, with 24 pct O_2 blast, showed an increase in production of 20 pct and an 8 pct reduction in coke consumption.

Reports on effect of oxygen on cupola linings vary from severe damage to no difference from normal blast. The results of these experimental runs in this country tally very closely with published reports of work done in Germany 10 years ago.

► Some prefabricated house builders aren't ready to cheer over news that AFL building trades unions have signed with Lustron Inc., which hopes thereby to be able to build 30,000 porcelain enameled steel prefabs next year. Volume production is scheduled for June. Aside from difficulties in sheet supply, steel prefab builders may yet have local labor troubles, and zoning laws to beat.

► Recent stainless steel application is in bank night depositories. No polishing, no corrosion, are the selling points for a company that plans to go into production soon on 8000 units.

ENGINEERING ASPECTS O



TYPES AND

By V. E. HILLMAN
Director of Research,
Crompton & Knowles Loom Works,
Worcester, Mass.

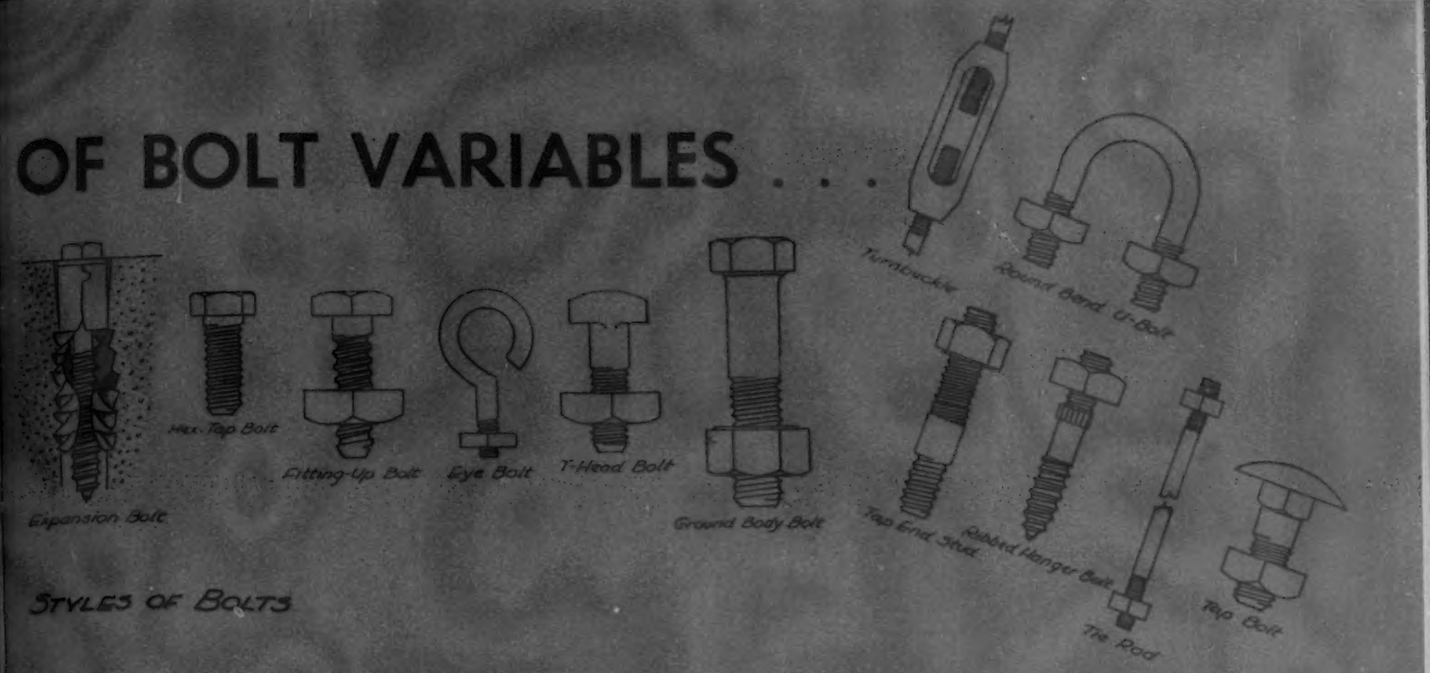
THE interest evinced in the torqueing of nuts is universal, the problem being spotlighted by present mass production requirements. The man with the wrench has much responsibility since the proper tightening of bolted connections is of tremendous importance. American and European research have proved the value of optimum clamping force on the efficiency of a bolted connection, but the determination of how much a bolt, stud, or nut should be tightened is a complicated problem. The mechanics involved in the tightening of bolted joints, the maintenance of that tightness, and its performance in service are highly controversial. Too little is known about the principles of assembly, and much has yet to be learned about the amount of torque which can be applied to a bolt. A mass of data, information and references have been compiled, but all too often the treatment of the problem is obscure and inexplicable. Investigations undertaken to coordinate and report facts for guidance in assembly operations have resulted in vague and contradictory conclusions. Variables give rise to discordant results. Consequently, no absolutely reliable procedure is available to govern the man with the wrench. Several aids, adjuncts and devices enable him to arrive at an authoritative standard of operation, but in the last analysis it is his own judgment, predicated upon feel, that enables him to speculate when a nut has been wrenched home.

When a nut is tightened against rigidly secure abutments, the movement of the nut along the bolt threads gradually places the bolt in tension, causing its fibers to elongate and thus giving rise to a tensile stress. Although the lead of the threads on a bolt and on a nut is normally the same, under load the bolt stretches while the nut compresses, resulting in increasing the lead of the bolt and decreasing the lead of the threads in the nut or tapped hole. This action operates to transfer most of the load to those threads of the bolt and nut nearest the bottom of the nut and to progressively unload the threads nearest the top of the nut. At the same time, the nut dilates at the bottom, thus decreasing the thread engagement on the very threads where the load concentration is the greatest. On larger size nuts, in particular, this dilation becomes an important factor in lowering the stripping strength of mated threads since thread depth does not increase in the same ratio as bolt size although nut dilation does. In addition, torsional stresses are developed, the magnitude of which depends upon the degree to which the bolt is lubricated. In some instances as much as 45 pct of the applied torque results in shear stresses.

The yield strength is a criterion of the load carrying ability of a bolt. The load elongation diagram, fig. 1, indicates that as the load is applied a bolt stretches. The straight portion of the graphed data represents the elastic range of the bolt. If a load within this range is applied and then removed, the bolt will return to its original length. Beyond the straight portion is the plastic range where permanent deformation occurs. At this value the bolt material ceases to act as a true solid and begins to flow.

Generally speaking, when a bolt is tightened, the resulting tension should not be so great as to cause permanent deformation. If for any reason the elongated bolt fails to automatically re-

S OF BOLT VARIABLES . . .



cover its normal configuration as the deforming forces are removed, the yield point of the material has been exceeded and the degree of tightness may be questioned. Once the yield strength has been exceeded, the danger zone is reached. Friction between the nut and bolt becomes pronounced, and continued turning of the nut results in severe torsional stresses, whereupon the bolt may be twisted asunder or the threads between the nut and bolt may become stripped. When this latter event occurs, the nut is turning but no further tightening occurs. In fact, there is a reduction in the clamping force. In critical assemblies, however, engineers advise and continue to advise tightening the bolt slightly beyond the elastic limit. They usually ask that the bolt be tightened to such extent that it will show a permanent elongation of 0.001 to 0.002 in. Their purpose is to assure that the bolt is drawn to its maximum tightness and the results are satisfactory. Of course, the permanent deformation should not be great, particularly when the shank of the bolt has not been reduced in diameter, else the deformation will be concentrated in the threaded section. Hence, tightening within the hazardous range suggests caution.

While adequate prestressing is necessary for bolt strength in service, the danger always exists that stripping may result from overstressing. Unlike shank breakage, progressive stripping may not be detected in assembly and a part may be put into service which has already partially failed while being put together. This often happens and may be due to excessive driver torques or to thread variables that reduce the normal load carrying ability of the mated threads. Fig. 1 shows that the bolt continues to resist with extreme force even after the yield point is reached. Such resistance continues until the stress-strain curve takes a downward trend.

An important, but too often ignored, phase of metal product manufacture is the efficiency obtained from bolted assemblies. This article discusses, from a practical engineering viewpoint, the function and limitations of a bolt in a tapped hole or nut and offers many helpful ideas for obtaining better results from the common bolted assembly. Procedures for determining the tension induced in a bolt during tightening are set forth, and such variables as machining, heat treatment and steel analysis are explored. A particularly useful table on defects in screw threads, their causes and defects, is also presented.

In deciding what bolt material to use, it is necessary to consider what the stresses on it will be in service. If operating conditions demand a tension of 20,000 psi, obviously a bolt possessing 30,000 psi minimum strength is sufficient to meet that requirement. There is no need of introducing a heat-treated alloy steel bolt (90,000 psi yield strength) merely to encourage the assemblyman to use a long wrench. Moreover, the man with the wrench today is using a power driver more and more and, since drivers are made to produce a given torque range, the danger of overtorqueing relatively small size and low-strength bolts and undertorqueing relatively large sizes of high strength is amplified. It is not the better part of economy to allow him

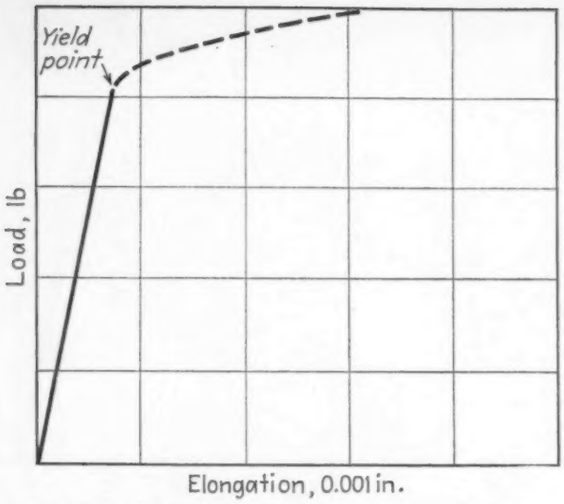


FIG. 1—This load elongation diagram shows the rapid acceleration of elongation of a stressed bolt after the yield point has been passed.

to satisfy his whims and fancies by exacting the last ounce of tension from a bolted unit. A workman gradually becomes accustomed to the stronger product unless he has some guide. His strength and brawn and enthusiasm will ultimately stretch and ruin any type of bolt regardless of its physical properties. Thus the human factor is of prime importance in tightening a nut. Excessive tightening encourages stretch rather than security and too much leverage promotes breakage of the assembly rather than compactness.

Instances are known where heat-treated alloy bolts gave precisely the same trouble (stretching) in assembly as plain carbon steels merely because definite specifications were not developed as a guide in tightening operations. No advantage is gained by turning the nut excessively. If the yield point of the bolt material is perceptibly exceeded, the holding properties of the bolt are destroyed. Therefore, cognizance should be taken of the fact that bolts are manufactured to resist certain working loads and not to withstand as much torque as the workman feels like applying during assembly. The average workman pulls on the wrench until he feels the bolt let go. This signal indicates that the yield strength of the material has been reached. Unfortunately, workmen have a penchant for adopting maximum wrench leverage that tends to stress the bolt far beyond the yield point of the material. They are likely to turn the nut until the bolt gives a little. Moreover, it is easier for them to pull up a smaller diameter bolt to its maximum effective tension than one of larger size. The exceptionally skilled workman, however, actually senses very slight yield in the bolt and he stops tightening when he feels this yield. It has been observed that a skilled workman will actually do a far better job of tightening bolts than is possible with a torque wrench, but not as good as with a micrometer.

The tension induced in a bolt during tightening may be measured by checking elongation. The principle is specifically applicable for bolts that are threaded their entire length or bolts so designed that elongation will be uniform throughout the length. Micrometer measurements are followed by some aircraft engine builders with satisfactory results, although the practice is not preferred. The procedure may not be the most practical for general use, but it will at least serve as a guide for spot checking. The stress developed in tightening is reasonably uniform throughout the portion between the head and the nut. Elongation is measured across the bolt ends (as shown in fig. 2), which are ground flat and parallel. A micrometer calibrated to thousandths of an inch is best suited for the purpose. Any steel loaded below its yield strength elastically stretches approximately 0.001 in. per in. of length under a load of 30,000 psi. The modulus of elasticity for all steels is practically constant. Therefore, tension in a bolt may be calculated by ascertaining the degree to which it elongates at the time it is being tightened. Assuming accessibility, the bolt is measured before tightening. After torqueing, the bolt length is again determined. The increase in length equals total bolt elongation. Assuming that a tightened bolt 2 in. long has been elongated 0.004 in., then the stress induced in that bolt is equivalent to 60,000 psi. If stressing in service is 60,000 psi, the bolt will sustain that amount of load if it be subjected to pure tension. Another bolt 1-in. long with a minimum yield strength of 90,000 psi can be stretched 0.003 in. and still return to its original 1-in. length. This would be the maximum tightness allowable.

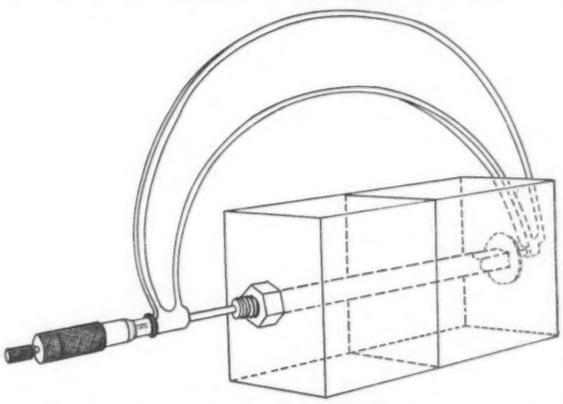


FIG. 2—The micrometer method of measuring nut tightness, shown here, is sufficiently precise but not always practical for present engineering needs.

In actual practice the bolt might be given only a 0.0015 in. per in. elongation, thereby developing a stress of 45,000 psi. Here the factor of safety is two. It should be borne in mind, however, that there is the possibility of error in short bolts. For example, at 60,000 psi yield strength, the elongation of a 2-in. bolt should be 0.004 in. If measurements were accurate to ±0.0005 in. (which is quite accurate for a micrometer), the stress could be from 52,500 to 67,500 psi. Consequently, the error would be ±12½ pct.

The tension up to which a bolt behaves in the aforementioned manner is a fundamental physical quality applicable to plain carbon or alloy steels either in the as-received or heat-treated condition. The important factors incident to tightness are the minimum yield strength of the steel, the length of the bolt, its overall stretch, the re-

sulting bolt tension, and its working load under service conditions. For most practical purposes, it is desirable to stretch a bolt so that its tension will be not more than 80 pct of its yield strength. A lesser degree of tension is at times desirable depending upon the circumstances of the specific job. The yield strength of the abutment may be a factor as well as the size of the bearing surface.

Some assemblies are satisfactorily fastened with bolt tension equivalent to 60 pct of the yield strength of the bolt material. Moreover, bolt dimensions are usually greater than are required and satisfactory tightening may be obtained with wide variations in actual tension of the bolt. Experience dictates the optimum percentage to adopt. Practice checked by measurements will develop the *feel* for tightness.

As mentioned, in exceptional cases where bolts must sustain dynamic loads in magnitude comparable to the yield strength of the bolt material, it is sometimes advisable to tighten the bolts so that they are stressed slightly beyond the yield point. The procedure is applicable to such critical assemblies as in aircraft and automobiles. Briefly, so-called preloading is necessary for severely stressed bolts. This procedure is followed to minimize the stress range to which the bolt is subjected and thereby insure greater fatigue life. An astounding increase in fatigue

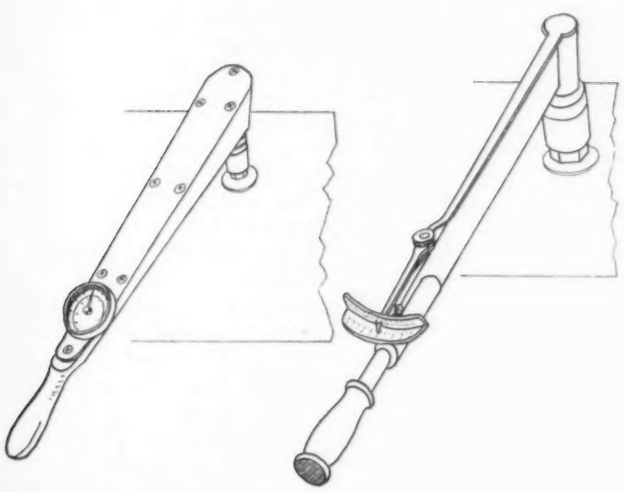


FIG. 3—Typical designs of standard torque wrenches.

durability can be produced by initial tightening. Severe service may produce failure unless initial tension equal to the external tension load is maintained. Furthermore bolts subjected to bending loads of various magnitudes fare better when maximum nut tightness is developed and maintained. Adequate preloading will also normally prevent a joint from being subjected to shear in a shear application due to the superior clamping force.

In prestressing a bolt due cognizance must be taken of the character of the abutment material. The formula $W = W_1 + XW_2$ has a definite application in tightening procedure. W is the total tensile bolt load, W_1 the prestress, W_2 the operating load in service and X a factor depending upon the properties of the bolted material. Where the abutments are absolutely rigid, X is zero and under such conditions $W = W_1$. Obviously in bolting rigid material, the total operating load, W, on a bolt can only equal W_1 as long as the bolt tension is fully maintained. But this can be lost through compression of the bolted material (commonly called brinelling) due to lack of seat area or through elasticity of the material, stretch of the bolt and nut, or creep of the bolt under load.

For one thing the properties of seat area to thread cross-section vary greatly with different combinations of bolts and nuts or tapped holes. Again, unevenness of the surface of the bolt and nut, lack of squareness of the tapped hole with the bearing surface of the nut, lack of squareness of the bolt head with the shank all affect the relative yielding of the bolted joint. Likewise, the use of washers or other springy members in an assembly reduces the amount of external load that can be applied to a prestressed joint before it starts being additive to the initial bolt tension.

The point at which the external load becomes additive to the initial tension, that is the point when X, in the formula $W = W_1 + XW_2$, acquires a finite value, will vary therefore with different assemblies. To determine the amount of this load, the bolted joint should be set up by tightening it to the desired prestress and then an external load applied in a tensile test machine using an extensometer or other means to determine the point at which the bolt begins to elongate.

Another way of determining the bolt tension developed by torqueing a nut is by the use of the torque wrench. By specifying nut torque, all nuts of the same size are presumed to give the same bolt tension. The procedure is the most popular means of specifying nut tightness. Its use offers the simplest though not the most precise manner by which to estimate the tension from the amount of torque applied. Two different designs of torque wrenches are shown in fig. 3. Torque wrenches may be obtained in several sizes and with dials in foot pounds or inch pounds. One type is entirely visual in character and depends upon the indicator reaching a prede-

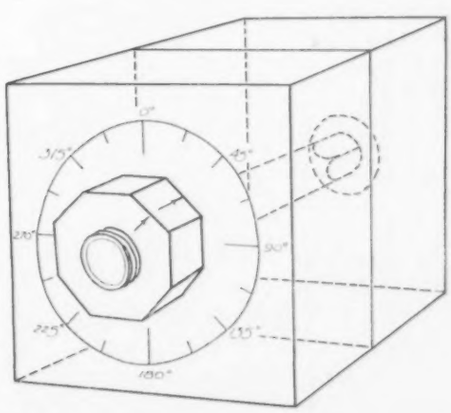


FIG. 4—In the angular turn method of measuring tightness, after finger tightness has been established, the nut is turned through the requisite number of degrees or revolutions to insure the desired tension. The zero point of the finger tight nut and its resulting angular turn are estimated. The protractor illustrates the principle involved.

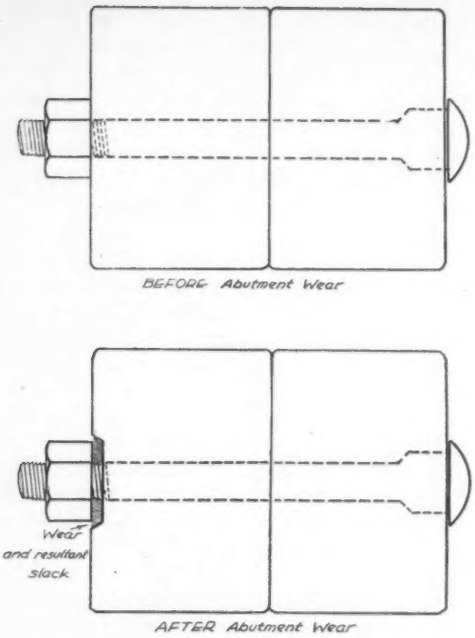


FIG. 5—In this exaggerated illustration of surface abrasion, the shaded area indicates abutment wear. A bolt elongated 0.006 in. during tightening suffers looseness when the abutment wear occurs to the extent of 0.007 in. The bolt relaxes to the extent of 0.006 in. and the remaining 0.001 in. constitutes free play.

termined value to insure maximum bolt tightness. In the other type of wrench, a preset torque value is also approximately and speedily measured by sight, but in addition thereto a distinct click is sounded and a strong impulse is imparted to the hand. Both types were developed to enable any operator to tighten nuts, screws and threaded parts to reasonably accurate predetermined torque values.

Further research is necessary to minimize the variability incident to the use of torque wrenches. Admittedly, their use occasionally produces erratic torque tension ratios, and they often fail to develop uniform tension in every bolted assembly of the same thread size. Their accuracy is sometimes open to challenge, and a certain technique is associated with their use. If the variability of friction could be reduced to tolerable limits, a torque wrench would be a more accurate tool. Notwithstnding, their use has found a niche on the set-up floor, modern industry being conscious of tightening torque.

TABLE I

Torque Values of NC3 Bolts, Dry Threads, With a Yield Strength Classification of 60,000 psi Min. Bolts Stressed to 80 Pct of Yield Strength

Bolt Sizes	Torque, Ft-Lb
1/4 x 20	9
5/16 x 18	16½
3/8 x 16	22
7/16 x 14	37½
1/2 x 12	54
9/16 x 12	104
5/8 x 11	155
3/4 x 10	275

Torque measurements give an approximation of the applied bolt tension. It is practical to control bolt tension by the control of nut torque as is evidenced by such procedure in many plants throughout the country. Bolt tightness should be examined during assembly. The checking of torque should be regular practice and the function of the inspection department, and it is the better part of wisdom to calibrate torque wrenches frequently.

A simple table correlating stress and torque for a variety of common bolt sizes would be ideal, but there are too many variables to make such a table universal in application. Each plant, each industry, each assembly line must set up its own torque figures depending upon local conditions and variables hereinafter mentioned. Torque limits, as set automatically, allow for the friction developed in tightening the nuts, bending due to misalignment, and stress concentration as the root of the threads. Table I is offered as a suggestion for stress and torque correlation.

The table was developed for a specialized industry and is not intended for general use. The extent to which the torque on a nut is converted to bolt stress depends upon nut and bolt thread variation, bolt alignment, degree of lubrication, plating, oxides, dirt, roughness and size of bearing surface, roughness and rigidity of the abutment, burrs, washers and the friction between thread of the bolt and the nut. Lack of concordancy is attributable to the aforementioned variables. Anything that tends to alter the frictional resistance of the threads will change the amount of torque required. The less the friction of the threads, the less torque needed to effect nut tightness. Slight changes will also result from the difference in pitch of threads and from variation in surface finish. Moreover, differences will be noted between dry and lubricated threads, and between clean and dirty threads. To all intents and purposes the variation in friction is not as great as might be anticipated. Greasy surfaces, soluble and fatty cutting oils and oxides might enlarge the range of irregularity of the torque stress ratio, but such lack of uniformity must be taken into consideration and allowances made. It is possible to give nuts a certain torque value in tightening and obtain bolt stresses that are within practical limits. If a sufficient number of tests are plotted, however, actual tightness might vary as the ordinary probability curve. Data accumulated indicate a total variability in bolt tension from constant wrench torque of not less than 500 pct. This viewpoint represents isolated cases and the extreme range. It is possible to give nuts a certain torque value in tightening and obtain bolt stresses that are within ± 7½ pct of the optimum value. Notwithstanding, experienced mechanics with wrench feel are scarce and any device that assists the inexperienced worker is welcome. The approximate tension in a bolt may be calculated by using the following formula:

$$\text{Tensile stress, psi} = \frac{\text{Torque (in.-lb)}}{0.2 \times \text{bolt diam} \times \text{mean root area}}$$

A recent introduction to nut tightening technique involves the use of the nut as a rough

micrometer. The nut is first tightened to firmly seat all contacting surfaces. Thereafter it is released and retightened finger tight. The resulting location is taken as the zero point. From this setting the nut is turned through a specified angle to produce the desired bolt tension. The results from this procedure are more accurate than from nut torque specifications, but the method is cumbersome. The angle through which the nut should be turned will vary according to the bolt size, length, and number of threads per inch. The technique has its advantages and disadvantages, but has the assurance of excellent tightness. It serves also to emphasize the desperate need for nut tightening accuracy. Fig. 4 indicates a setup that suggests the principle involved. Of course, in shop practice the zero point and the angle or number of turns are estimated. A table may be developed that will suggest the angular allowance for each type of nut. Experience as to what constitutes a tight nut is the basis for all assembly values.

The angular turn method has its limitations. It assumes finger tightness as a constant, which is not true. It requires tightening the nut, loosening and tightening again, along with the delay in measuring the angle. It is not practical for hard-to-get-at bolts. Results will vary with misalignment of bolt holes, with different types of nuts, and different surface conditions of the abutment.

It has been suggested (1) that no adequately tightened bolt or nut ever became loose initially from vibration or shocks; (2) that looseness occurs in bolts provided with positive and absolute locking against the nut turning (castellated nuts); (3) that a nut that is properly tightened does not require a lock because friction is ample to keep it in place; (4) that the pressure against the surface of the threads and the underside of the bolt head is the best possible kind of a locking device; and (5) that this pressure is more than enough to resist any force which vibration can possibly produce. Hence, to keep bolts tight the one and only requirement is to maintain the tension in the bolts equivalent to what it is on the assembly line. However, decreasing the distance between the two outside surfaces of the abutments of a tightened assmbly develops slackness, as illustrated in fig. 5. The bolt indulges in free play when its tension is relaxed. The reduction in distance may amount to only a few thousandths of an inch, but the result is the same as turning the bolt or nut backwards upon its threads. The tension holding the parts together is lost, and looseness results.

The normal wear of the abutments during the life of the machine must be compensated for either by further tightening during service or by sufficient initial tightening during assembly. Contacting surfaces of any two metal parts bolted together are rarely absolutely flat. Castings have rough surfaces; steel stampings have raised edges where bolt holes are punched through; and machined surfaces are striated. They possess minute grooves and threadlike lines. It may be difficult to pull such parts together with absolute compactness regardless of how tightly the bolts are wrenched. Vibration, shock, reversed stresses, and impact may cause an irresistible wearing away of the uneven surfaces. Moreover, particles of paint, dust, enamel, scale and rust on the contacting surfaces of the bolted parts are gradually pulverized, thereby reducing the distance between the outside abutment areas where the bolt head and nut are gripping. A spring washer, ready to come into action the instant the pressure imparted on the assembly line is reduced, may remedy the situation, but the pressure of the washer must be adequate to keep

TABLE II

Some Defects and Their Causes Found in Screw Threads

DEFECT	CAUSE	EFFECT
Machining tears and laps	1. Poor coolant 2. Dull taps 3. Dull chasers 4. Poor face grinds 5. Improper setting of chasers 6. Poor cam 7. Excess speed 8. Oversize blanks 9. Loading of threads of tap or chasers	
Thin threads	1. Shaving of improperly set chasers 2. Mismatched roller dies 3. Crooked start 4. Dies too large or clumsy	
Folds and laps (rolled threads)	1. Improper helix angle 2. Improper setting of dies 3. Skidding of bolt blanks 4. Mismatching dies	
Slivers or flakes	1. Mismatched dies 2. Tipped start 3. Deep cross nicking 4. Slipping at start 5. Improper helix angle	Reduces thread stripping strength. Increases danger of thread removal by galling and fretting
Out of roundness	1. Out of round blanks 2. Oversize blanks 3. Too little leave off or roller dies 4. Dies too short 5. Poor thread form in leave off 6. Crooked start 7. Mismatched dies	Reduces load carrying area of thread
Lead errors	1. Wrong lead on dies 2. Poor setting of dies, taps or chasers	May increase load concentration on bottom threads
Angularity of axis of thread with the axis of bolt shank or nut body.	1. Improper alignment of tools and work 2. Bent or angled bolt shanks 3. Angled drilled holes in the nut	Load is concentrated on one side of the threads and facilities stripping and galling
Thread drunkedness	1. Misalignment of threading tools and the work 2. Misalignment or mismated dies 3. Improper helix angle of dies 4. Intersection of the crest of the starting radius with the crest of the threads of a flat roller die presents a line which is not normal to the axis of the die 5. Crooked relief on thread roller dies 6. Tipped start 7. Slippage of blank at start	1. Consentrates load on one side of shank 2. Causes lead error and hence further unbalanced load concentration
Shallow threads	1. Undersize blanks 2. Poor setting of chasers of roller dies	May reduce stripping strength of threads
Tapered external threads	1. Tapered blanks 2. Poor roller die setup 3. Misalignment of die with spindles 4. Poor or slow start 5. Bad cramming 6. Loose chasers 7. Chasers shaving	

the parts together as tightly and rigidly as was intended by the machine designer.

Adequate physical properties are the principal desiderata in drafting bolt specifications to sustain service shock, impact, fatigue, tension, bending and reversed stresses. The accuracy with which the thread is rolled or cut should be considered. Table II suggests some of the defects that may be found in screw threads and their causes. Advantages are to be gained by careful design, including proper proportioning of bolt and nut strengths (particularly with heat-treated and alloy bolts), the number of threads in engagement, the selections of nuts with proper wall thicknesses, and allowances for extension of the first (tapered) bolt threads through the nut. Good materials and heat treatments are of paramount importance.

It should be borne in mind, however, that the value of alloy steels is not necessarily a function of their composition. Their serviceability lies in the depth of their hardenability. A Jominy specification will insure a steel that will harden to a proper depth. Any guide that demonstrates the hardening effect of the alloying elements is a worthwhile notation of limits. The test discriminates between steels that will respond to heat treatment and those that are unsuitable for the purpose in mind. The Jominy test insures only the initial step, that is, ample hardenability. It does not guarantee the proper heat treatment of a batch of bolts. Quality is dependent upon quenching, initial hardness, grain size, microstructure, drawing procedure and all around technical control. It should be understood that the final physical properties of a bolt are produced in the tempering or drawing operations wherein minimum yield strength and suitable ductility are developed. Various strength levels may be obtained by modifying the drawing procedure after proper hardening. Economic considerations dictate whether heat treatment should be performed prior to or subsequent to machining. Heat treatment before machining eliminates surface decarburization and thread distortion, and promotes cleanness of product and increases fatigue life. This is especially true where the heat-treating atmosphere cannot be controlled. On the other hand, machining after heat treatment is a more expensive operation especially in bolts having high yield strength characteristics. Machinability and bolt strength are diametrically opposite requirements. A machinable bolt may be on the low side of the requisite yield point. Hence, when high physicals are necessary, heat treatment after machining in a controlled atmosphere seems a more desirable procedure.

Bolt steels cover a wide range of specifications, but are usually SAE 1010 or SAE 1018. SAE 1112 will meet many requirements where the impact value of the material is sufficient to sustain the duty imposed during service. Bolts subjected to moderate stresses give a good account of themselves when made from heat-treated SAE 1030, 1035, or 1040. SAE 1038 is ordinarily used for cold-headed and SAE 1040 for hot-headed bolts. Next in order of importance is the desirability of using manganese as an alloying element. Heat-treated SAE X1330 and X1335, where manganese is a toning alloy, offer appreciable economies along with excellent physical properties. In cases of exceptionally high working stress and severe conditions there is no substitute for a properly heat-treated alloy steel. Many analyses are available with subtle distinguishing characteristics such as SAE 8627H, 8727H, 8630H, 8730H, 8635H, 8735H, 4130H, 4140H, 2330, and 3135. The H indicates that the steel is purchased to restricted hardenability band limits. For convenience of reference the physical properties of constructional bolts may be classified into four stress groups:

Group	Minimum Yield Strength, Psi
1	30,000
2	60,000
3	90,000
4	120,000

Summarizing, then, it may be said that ways and means of determining accurate bolt tightness are impracticable in most machine assemblies. The micrometer method of tightening is sufficiently precise but not always practical for any present engineering need.

Excessive tightening encourages stretch rather than security.

A bolt stressed too much beyond its yield strength may not adequately serve as a fastener.

The degree of tightness in a bolted assembly should be a function of its working load.

For most practical purposes it is desirable to stretch a bolt so that its tension will not be more than 80 pct of its yield strength.

The tension induced in a bolt during tightening may be measured by checking its elastic elongation.

The torque wrench is the most popular device for specifying nut tightness.

The angular turn method of measuring nut tightness is still to be perfected.

Tables specifying nut tightness should be specially developed for each assembly line. The terms in which nut tightness are specified may be foot-pounds, elastic elongation per inch of bolt length, or the degrees of angular turn.

Wear and abrasion of the abutments will develop bolt looseness.

Important considerations that enter into the proper functioning of a bolt are: (1) the yield strength of the material; (2) the tension developed in tightening; (3) the duty imposed in service; (4) the elasticity of the abutment; (5) loss of tightness in service by wear; and (6) abrasion and corrosion.

Bolt looseness may be the result of improper tightening procedure.

Bolt steels, heat treatments and physical properties are adequately standardized.

A steel of minimum yield strength should be selected consistent with operating and service requirements.

ACKNOWEDGMENT

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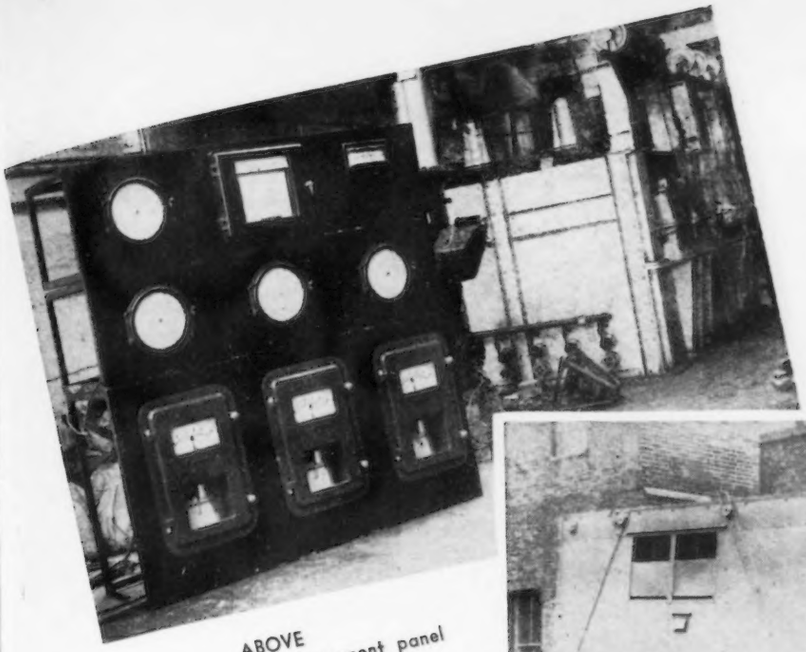
Mobile Lab Aids British Steelmaking Production



ABOVE
FIG. 2—Unit-type instrument panel set up in a steelmaking plant.

o o o

RIGHT
FIG. 1—The 3-ton truck within which is mounted a mobile laboratory and office.

A MOBILE laboratory and office designed for "field" operation in iron and steel works, has been built by the steelmaking division of the British Iron & Steel Research Assn. Mounted on a 3-ton truck, shown in fig. 1, a box body contains the laboratory instruments and can be lifted off the chassis by crane and transported to otherwise inaccessible parts of the works.

Since various combinations of instruments may be wanted in different circmstances, each item is mounted separately in a lightweight panel and assembled on a frame to form a standard unit. Two standard frame sizes are used to provide further flexibility, one being half the size of the other. The removable body is fitted in addition with small laboratory and workshop benches, writing table, cupboards, field telephones, lighting and air conditioning, so that it can also be used as a central office for works trials.

Instruments comprising the equipment are: ring balance flow meters of various ranges, indicating and recording potentiometers, indicating and recording millivoltmeters, total radiation pyrometers thermocouples, gas analysis apparatus, CO_2 recorders, pressure recorders, and an immersion pyrometer for liquid steel temperatures. Fig. 2 shows a unit type instrument panel set up in a steel plant.

A description of a mobile laboratory used by Ford Motor Co., Detroit, was described in THE IRON AGE, *Sept. 25, 1947, p. 68.—Ed.*

Use of the mobile laboratory is claimed to have increased steelmaking output on the order of 10 to 20 pct in some plants.

Makes 5 Million Exposures Per Second

A CAMERA 10 times as fast as any previously made which takes more than 5 million pictures a second is expected to reveal new scientific information about electrical charges, high explosives and shock fronts in the study of supersonic flight. Principal feature of the camera is a device which dissects the image on the original film so that segments of a few hundredths of a millimeter each become frames for exposure in an ordinary 16 mm projecture. The camera is shutterless and uses a flash lamp with a flash about 100 times as fast as a news photographer's flash bulb. When a motion picture of a rifle bullet is projected on a screen at the usual speed, a minute is required to show 1 in. of the bullet's movement. This camera was described at the thirty-second annual meeting of the Optical Society of America by Dr. Brian O'Brien, director of the Rochester Institute of Optics, University of Rochester.

What Makes Good Industrial

Amid the hurly burly of the physical problems of producing a product today, many industrial management executives unintentionally ignore the keystone of a successful enterprise—good industrial relations. This article serves as a warning of the possible consequence of such forgetfulness and suggests several simple, but effective, steps that can be taken to improve plant morale.

o o o

SOUND company policy on purely business matters goes a long way in developing sound industrial relations. Conversely, where unsound policy prevails, the smaller are the chances of good relations. The first reaction to this contention is usually that sound thinking would naturally extend to all departments of a business. This usually is true, but not always. In any event this discussion approaches the problem from a somewhat different point of view.

It may sound strange, but it is often true that top company policy on industrial relations is beyond reproach, but by the time it is administered in day-to-day work it doesn't sound the same when it reaches the average employee. On the other hand quite often the top policy makers haven't the true and whole picture of the problem as it actually exists in the plant. There are a number of reasons for this situation, some of which are external to the organization and others internal.

During the past few years government regulations have put a heavy burden on all companies, particularly the smaller ones. This burden is not one of expense only, but also one that has increased the industrial relations problem. First, industry in general has been pictured as a culprit needing all kinds of discipline to be kept in line. Then government regulations governing indus-

Relations ? ?

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trial relations were put into effect that were difficult for top executives to understand, let alone explain to supervision down the line. That is no reflection on top management because the government agencies themselves didn't have a clear understanding. This led to a period of interpretations of the law which kept everyone along the line pretty well confused. In addition, in many industrial relations' issues, management has not been able to express itself fully to employees. Nothing disrupts the confidence between employer and employee more than the employers' inability to give straight-forward and direct answers to employees' questions. Nothing destroys the confidence of supervision more than a constant change of rules and regulations. Recent trends seem to indicate some improvement in these external causes of industrial relations' problems.

Another source of trouble in industrial relations is internal to the organization. It rests in the fundamental overall policy of the company.

The beginning of most good things in the life of an organization is sound thinking and planning at the top. Without it a whole organization may become so taxed, not so much by the volume as by the range of problems, that it loses touch with the details of running the business. The habit of sound thinking is contagious and develops throughout an organization. On the other hand, where it is missing a continuous state of confusion may exist where few employees have time to relax and give each section of the business its proper attention. Everyone along the line is usually taxed to capacity on expedient measures in order to get the main things accomplished. Too often the picture changes so rapidly that supervision itself becomes confused as to company policy and, to say the least, experiences some difficulty in interpreting it to the rank and file of employees.

The hue and cry of supervision down along the line today is that they can't get their superiors into their departments long enough to point out their requirements. Too much of the upper levels of supervision have become so enmeshed in desk problems that they have lost close contact with the various departments. The usual reason given is that, among other things, the personnel problem takes most of their time. As a result both ends seem to slip and a poor job is done both on the functional duties as well as on

industrial relations. Whatever the cause there seems to be little question about the result.

Recently the superintendent of one of the largest companies made the statement that never in his 40 years with the company was there a time when the general superintendent knew less about the daily operations of the business. That was no reflection on his superior because he was really a good man. Still the situation was so bad that the purchasing of much needed equipment was delayed indefinitely, not because it wasn't urgently needed or a good investment, but because it just couldn't be gotten around to. After weeks of waiting for action on a requisition for essential equipment, a clerk came back to check the necessity of the purchase. The clerk was a good clerk but the superintendent couldn't explain the whole process and describe a piece of complicated equipment to him. It wouldn't have done any good because the clerk wouldn't have understood it anyway. The upshot of the thing was that the superintendent was about ready to quit out of pure frustration.

A good share of the trouble stems back to the fundamental plan of doing business. Sounder planning based on careful plotting of the future course not only helps to eliminate the greater part of the expedient decisions which today plague the every-day operation of an organization, but also leads to more consistent administration. Where the policy has been well thought out and laid down beforehand, it guides action throughout the organization rather than the reverse. A well-defined program should be reduced to the simplest terms so that it can be explained easily and understood down along the line. The basic plan should be all-inclusive, covering all phases of the business including industrial relations.

Top management must gage more closely the ability and capacity of the whole organization. It isn't unusual to find companies loaded with problems far beyond the capacity of a reasonable organization with the result that the final effort in most directions suffers.

In order to understand these factors, management's decision should be the result of study by all levels of supervision. In addition to the fact that this method of procedure builds up the confidence of and in supervisors, the chances are far greater that the thinking of the whole organization will lead to a sounder foundation for action. This procedure will help to make supervisors an active part of management which, after all, is the goal of all progressive management today.

Everyone along the line seems to agree that foremen are part and parcel of management, but in too many cases it is a matter of lip service only. This is particularly true on matters pertaining to industrial relations where the complexities of human nature enter the problem. Top executives need the advice and counsel of all of their staff down to the bottom foreman in forming regulations governing human behavior. The chances are that the man nearest the workman is in closer touch than an executive whose mind is filled with other problems.

With sound thinking at top levels as a starting point each department of an organization can extend sound thinking and planning to his particular group. The result of this is that most of the normal functions require a minimum of daily attention. Then the unusual problems can be given concentrated attention and decisions can be reached based on quiet and objective thinking. On the other hand, where sound thinking at the top is lacking, slipshod habits of thinking permeate the whole organization and a condition is created where everyone is taxed to capacity with expedient measures. These lead to quick changes of plans which cause upheavals all through an organization. The cost of these upheavals can never be measured.

Good industrial relations start with a sound overall policy which gives the proper background and emphasis to each section of the business. In all basic planning from the top down proper recognition must be given to the human relation problem. Educating employees to recognize the necessity and dignity of their doing a good job is just as important as selling consumers on using the company's product. It should be second in importance to no other function of the company. Careful thought and consideration should be given beforehand, instead of as each emergency arises. Usually this is too late; some harm may have been done, and the good that might have been done by taking the initiative is lost. Too often, at a late date, quick decisions are made that are the result of immature thinking under abnormal conditions when all parties concerned have reached the stage where reason has given away to standing on questions of so-called principle.

Good industrial relations are based on faith and confidence, which in turn are built up on the little things that occur in daily contacts rather than the big issues. Years of building up of mutual understanding can be undone by a few ill-considered decisions. Good relations start with sincerity followed by policy based on sound thinking of all levels of management.

Carbides, Nitrides And Porosity in Aluminum

Taking issue with the belief that hydrogen is the primary cause for porosity in aluminum alloys, the author points to carbides and nitrides as being the major contaminants. He discusses the chemical reactions that take place, involving carbon and nitrogen, and the conditions under which they transpire to cause a reduction in physical properties. Results of an investigation indicating the lack of correlation between strength properties and conventional X-ray examination techniques are also presented, and emphasis is made of the lack of satisfactory analytical methods for isolation and identification of minute amounts of active, nonmetallic constituents.

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THE accepted theory concerning the major cause of porosity in aluminum alloys deals with the effects of hydrogen upon the molten metal. Recently, a comprehensive study of the phenomena affecting gas porosity in aluminum stated that, in comparison with other metals, the problem of gas in aluminum is relatively simple. "The only gas causing trouble is hydrogen and only because of the sharp decrease in solubility as the melt approaches the solidification temperature and solidifies. The problem becomes one of appreciating the importance of atomic, rather than molecular hydrogen and of applying the fundamentals of absorption and diffusion to understand the conditions required to avoid hydrogen absorption and to facilitate its elimination from the melt."

The problem of porosity in aluminum is not quite that simple. Effects of hydrogen and methods of controlling this gas have long been understood. Many defects in aluminum, which are evidenced by the formation of porosity under various conditions, do not readily yield to the theory that they are due to the effects of hydrogen contamination. Though hydrogen may be the major contaminant in gaseous form, the significance of nonmetallic active impurities in aluminum must be thoroughly studied and understood.

These active solid impurities consist chiefly of carbides and nitrides. Eastwood paid but scant attention to these factors, and the fact that carbides exist in aluminum was noted by quotation of the following excerpt from another work; "Carbon monoxide and dioxide react to form Al_4C_3 and Al_2O_3, the carbide being present especially when metal is melted and held at high temperature under CO_2." Nitride formation was mentioned only in connection with the practice of using dry nitrogen gas as a flux for aluminum. It was noted that "dry molecular nitrogen is used for degassing, but nascent nitrogen will form stable nitrides. No known bad effect results from these nitrides because they fail to decompose in the freezing range."

Neither carbides nor nitrides of aluminum are stable in the presence of water at temperatures under 1250°F. Above this temperature, water tends to react with aluminum directly to free hygrogen, which may or may not dissolve in the metal, and to form oxides. Below 1250°F, however, water does not tend to break down readily, but is most active in contact with carbides or nitrides, and reactions take place which liberate ammonia or several hydrocarbon gases. Due to the fact that such reactions can take place only at the surface of molten, or hot, solid metal, no detriment is incurred by these reactions while the metal is liquid or semiliquid, prior to casting.

In fact, the reaction between water and the active constituents can be used as a means of ridding aluminum of the inclusions. Neither the carbides nor the nitrides decompose within the solid metal to liberate gases, except when they are contacted by water molecules; therefore, in a general sense, they can be considered, superficially, as stable nonmetallic inclusions. As their total combined quantitative presence rarely ex-

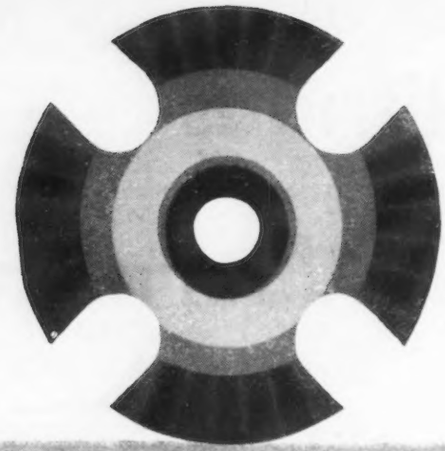


FIG. 1—X-ray photograph of a part specified acceptable by X-ray testing, which fractured under 400 lb compression load.

ceeds 0.5 pct, even in metal handled in very poor melting equipment, they are usually ignored in considering the cause of failure in subsequent stages of production. It can be demonstrated that these active inclusions have very important effects upon the solidity, strength, appearance and corrosion resistance of aluminum.

Not only are carbides or nitrides of aluminum formed in melting and alloying aluminum, but active carbides of several alloying constituents also form. In particular, this is true of copper, calcium and lithium, when present. Other carbides, such as iron or silicon, if formed, are not now believed to be the source of subsequent gas defects, as they are not active in the presence of water at temperatures common to aluminum use or processing. Reaction of the active carbides liberates either methane or acetylene, and the reaction between the nitrides and water frees ammonia. This is readily demonstrated by observing the scent of the fresh fracture of practically any aluminum alloy. The pungent odors of ammonia or moist acetylene are immediately distinguishable. Conventional gas analysis control techniques, as applied in metallurgical chemistry, are not of such a degree of accuracy as to be applicable. As a result, very few reports have ever attempted to disclose and identify qualitatively or quantitatively gases other than hydrogen.

That gases other than hydrogen do exist in aluminum alloys has been asserted on several occasions. Tullis[2] commented on the fact that carbides and nitrides were invariably present in secondary aluminum alloys and were identifiable by the simple test of smelling a fresh fracture. He outlined in detail both the probable means of formation of such contaminants and also means for their elimination.

In more recent years, Erickson[3] quoted work done by Gwyer, which, although not attempting to relate itself to the presence of carbides or nitrides, does demonstrate in quantitative terms the presence of significant percentages of gases other than hydrogen, some of which might readily be due to the breakdown of combined carbon or nitrogen.

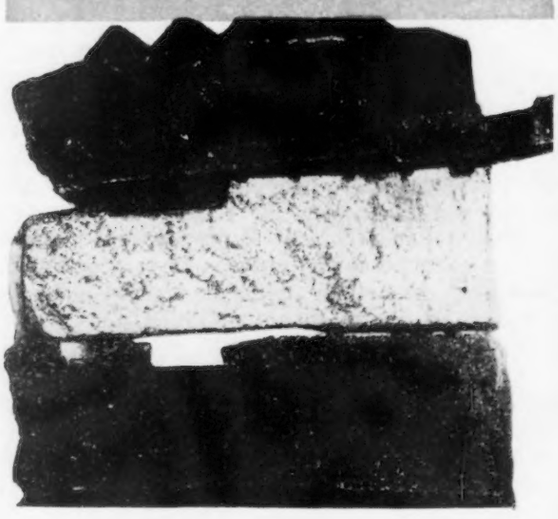
In analyzing the gases removed from solid aluminum alloy samples melted in a vacuum, Gwyer reported that of the total volumes derived, up to 80 pct consisted of H_2 to 11 pct N_2, to 8 pct CO_2, to 7.5 pct CO, to 4.5 pct O_2 and, significantly, up to 25 pct acetylene. The proportions of gases derived from various samples differed with the composition of the alloy as well as with prior metallurgical history with respect to the methods of melting and alloying. However, as indicated by Eastwood[1], some of the above gases were undoubtedly derived from the decomposition of adsorbed surface films. Others may have derived from thermal decomposition of oxides, carbides and nitrides. In no other available published report has so great a proportional presence of C_2H_2 been noted.

Mechanism of Carbide Formation

Opinions vary as to the precise manner of origin of carbides. Tullis[2] observed that they were most prevalent in remelted aluminum prepared from scrap which had been badly contaminated with oil or grease, or which had been melted in reverberatory furnaces wherein the flames of burning oil were in direct contact with the melt. Erickson[3] observed that "the presence of grease acts like moisture on the metal and is an excellent source of hydrogen. Many of the complex hydrocarbons decompose within the melt to give aluminum carbides, aluminum oxide and hydrogen." The effect of prolonged exposure of hot or molten aluminum to CO or CO_2 as reported by Eastwood[1] was noted. Erickson quoted an observation that direct contact of the combusting flames of either oil or gas with the metal results in the absorption of hydrogen.

Hiram Brown[4] has discriminated between several melting methods and fuels in their relative effects on some aluminum alloys, and concludes tnat the use of metal melted in direct fired, oil-fueled reverberatory furnaces is not satisfactory due to the pronounced effect such melting methods have upon the porosity of the metal. Though not so stipulated by the above authors, in actual point of fact, the observed

FIG. 3—Uppermost of three specimens indicates fracture of a part from the sample in fig. 1. Bottom piece represents another casting which broke at 700 lb. Middle specimen illustrates a normal fracture. 4X.



defects in melting in contact with oil flames, or, for that matter, in contact with the flames of coke or coal, or gas, relate more to the formation of carbides and nitrides than to the solution of hydrogen.

In most melting furnaces, even those operated on the reducing side, the conditions are not favorable to the solution of hydrogen in the melt, due to the fact that little or no free hydrogen is present in the flue gases contacting the melt. Further, the reaction between the hot metal and the superheated water vapors is such that little hydrogen could be made available to the melt, except at very high temperatures. This is not to minimize the actual effects of hydrogen solution encountered in poor melting practices, but it is a fact that in the preparation of aluminum alloys in reverberatories fired with coke, where little or no hydrogen gases can exist (due to the fact that the fuel is substantially pure carbon), porosity is still a serious defect in the resulting metal, although it is rarely visible in the ingots cast from such melts.

This porosity can only be due to the formation of carbides while in contact with the very high concentrations of CO_2 or CO. That is not detected in the ingots is due to the fact that in common practice the ingots are chill cast. Even where moisture is abundant, as in ingot machines using water quench systems, the solidification of cast ingots is too rapid to permit of any other than the slightest surface reaction with active carbides in the metal.

Difficulties in Determining Carbides

Even when present in excessive quantities, carbides are difficult to isolate. Except for the superficial smell test, no techniques have yet been developed for precise determination by qualitative or quantitative means of either carbides or nitrides. In the usual run of metallurgical chemical tests, no effort is made to find the total combined aluminum present in the metal, for

FIG. 4—Photograph illustrating polished and etched parts shown in fig. 3. Samples A and B represent upper and lower samples in fig. 3 respectively. Specimen C indicates the structure of satisfactory metal. 4X.

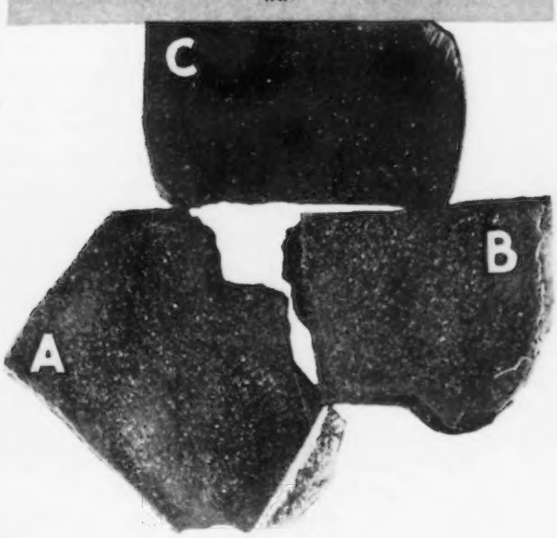


FIG. 2—X-ray photograph of a part obviously porous, which fractured under 2000 lb compression load.

few specifications have a limitation on this factor.

The technique which offers the most probable promise in carbide and nitride analysis in aluminum is that which involves combustion of a specimen in an atmosphere of pure oxygen, in a closed system, such as reported by Bobalek and Shrader[5] in their study of hydrogen, carbon and nitrogen in magnesium alloys. Although their highly theoretical paper dealt solely with the determination of gaseous constituents in magnesium, it is most significant to note that their report shows far more carbon to be present in magnesium-aluminum alloys than in pure magnesium. Furthermore, carbon is removed and determined in the combustion analysis process, wherein the entire specimen is consumed by oxygen, than is determined by any of the alternative techniques which do not involve complete oxidation of the sample.

Though Bobalek and Shrader were not endeavoring to establish the presence of either carbides or nitrides, their work can be interpreted to substantiate the presence and effects of the carbide constituent as formed in aluminum in the alloy. This conclusion substantiates the belief that grain refinement of heat-treatable magnesium alloys, affected by superheating the melt, is due to formation of minute particles of aluminum carbide in the metal, which act as nucleation points for crystallization control.

The combustion analysis technique would mask whether or not carbon was present in combination with aluminum or any other metallic constituent, or present as a dissolved gas, CO_2, CO, C_2H_2 or CH_4. Similarly, it would not establish the form of retention of nitrogen. These facts would have to be determined by other methods, but the total presence of carbon and nitrogen in the metal could be closely determined. The process is of such nature, however, as to render it of little practical value in a production control laboratory, due to the exactness with which the procedures must be followed.

Not one of the references to carbides in aluminum has endeavored to present precise quantitative figures, although the fact that carbides are the probable source of porosity in aluminum is

amply substantiated by many indirections. Eastwood[1] presents the following reaction between metal and water as the source of atomic hydrogen which he believes is the cause of pinhole porosity; "metal plus water yields metal oxide plus atomic hydrogen." It is the atomic hydrogen which he believes is rapidly dissolved into the metal, to be almost instantaneously reprecipitated as the metal freezes, thereby forming gas channels of the typical subsurface type known as pinholes. He points out, however, that this porosity tendency is most pronounced in silicon-aluminum alloys which contain calcium or lithium. In fact, Eastwood notes that in a silicon-aluminum alloy containing as much as 0.008 pct Ca, not only is porosity a problem in initial casting of the ingot, but the effect is carried over from melt to melt. This tendency is recognized by specifications which limit the total of calcium in a silicon-aluminum alloy to a maximum of 0.005 pct. It is readily shown that as the calcium increases, the porosity increases proportionally.

The known affinity of both lithium and calcium for carbon, plus the excessive activity of the resulting carbides when reacted with water, promotes the thought that it is not an increase in the affinity of the metal for hydrogen, due to some inexplicable effect of calcium or lithium on the characteristics of the metal in this regards, which causes the increase in pinhole porosity, but the quite logical increase in concentration of active carbides in the metal, which (in reacting with mold moisture) liberates increasing quantities of hydrocarbon gases, primarily acetylene, within the metal. All of the practical and theoretical aspects of casting techniques favor the active carbide reaction over the precipitation of hydrogen.

In order for hydrogen to be the source of pinholes in the metal, assuming the metal to be substantially hydrogen-free as it enters the mold, it requires that the hot metal heat the cold mold gases to a temperature above 1250°F. At this temperature the metal can react with the moisture, as indicated by Eastwood, releasing active atomic hydrogen. While the mold gases are being heated, however, the metal is chilling rapidly, particularly at the surface in contact with these same gases. Water takes a considerable amount of heat to transform it into steam, to superheat it, and to react it to liberate hydrogen. Further, a very tough oxide film of aluminum is forming all this while, from contact with free oxygen already in the mold, and from additional contact with whatever oxygen might conceivably be liberated from the water. Therefore, at the time atomic hydrogen is theoretically liberated, it would have to be absorbed through the oxide film into the chilled metal, following which, it would be reprecipitated to form little pinholes in the metal.

Knowing the fact that oxide film which forms on aluminum is so tough that it limits the escape of gases from semiliquid aluminum being fluxed with chlorine or nitrogen, and that recommended techniques require constant stirring in order to facilitate the escape of gases from the metal being fluxed, it is all the more improbable that such a series of reactions takes place.

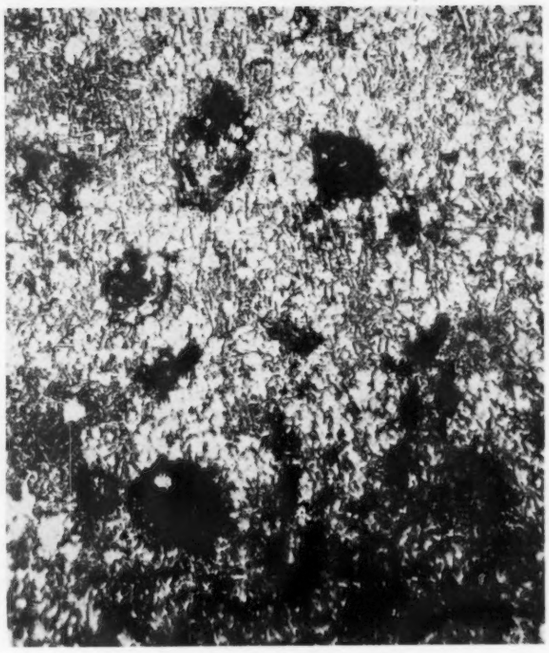


FIG. 5—Photomicrograph indicating structure of the lower sample of fig. 3. 250X.

The necessary steps for formation of gas defects in aluminum, through reaction of carbides with water, is not only far simpler, but chemically and physically more logical. As the metal containing carbides and/or nitrides is poured into the mold, instantaneous reaction between the carbides exposed to the water in the mold takes place. Turbulence of the metal, as it fills the mold, constantly sweeps additional carbides to the surface of the casting, where additional reaction can occur. The active constituents are already within the metal, so that as gas evolution takes place, though part of the gases may escape through the metal face and oxide film, part of the gas will expand within the liquid metal.

Mechanics of Carbide Pinholing

Wherever a carbide particle penetrates the aluminum surface, the oxide film is momentarily broken. As the volume of resulting gas far exceeds the escape area afforded by the slight opening in the oxide film, and as the tough film of the surrounding aluminum oxide restricts expansion of the surface opening, the bulk of the gas would be restricted and forced to expand as evolved, inwards below the casting face. Further, as these channels open within the liquid metal, as the melt begins to freeze, the reaction can continue as new carbides are exposed to the expanding gas holes. Therefore, the hotter the metal, and the higher the concentration of carbides or nitrides, the larger and more numerous are the defects. This is borne out in all references to carbide active constituents such as calcium or lithium, and is, in general, more probable than the more involved mechanics of atomic hydrogen pinholing.

In another paper relating to gas porosity in aluminum, one writer[6] has expressed the belief that 98 pct of the porosity encountered in die-

castings is due to trapped mold gases. The report contradicts itself, however, since the author asserts that the trapped gases are invisible in normal X-ray or metallographic examination, and that X-ray diffraction studies failed to show the presence of hydrogen supposedly in solution in the metal. The fact that these diecastings, produced in high pressure machines from metal of exceptionally sound initial structure, with respect to freedom from hydrogen contamination, are subject to blistering when efforts are made to heat treat them at the normal solution treating temperatures, is presented as proof or indication that the gases must result from entrapped cavity gases. No adequate explanation for the inability to detect them under the microscope, nor by X-ray technique, is offered. It is stated that the "heat treatment alters the form of gas retention," but no definite evidence of trapped or dissolved gas is presented.

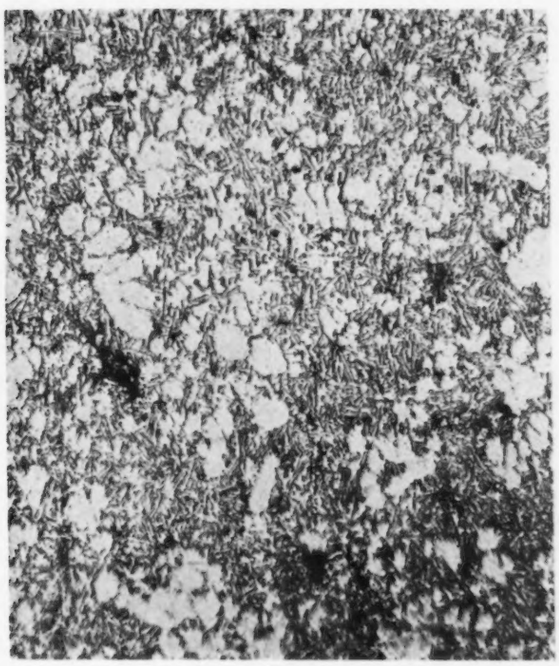


FIG. 6—Microstructure indicating an acceptable sample which, though nonhomogeneous, is relatively free of voids and inclusions. 250X.

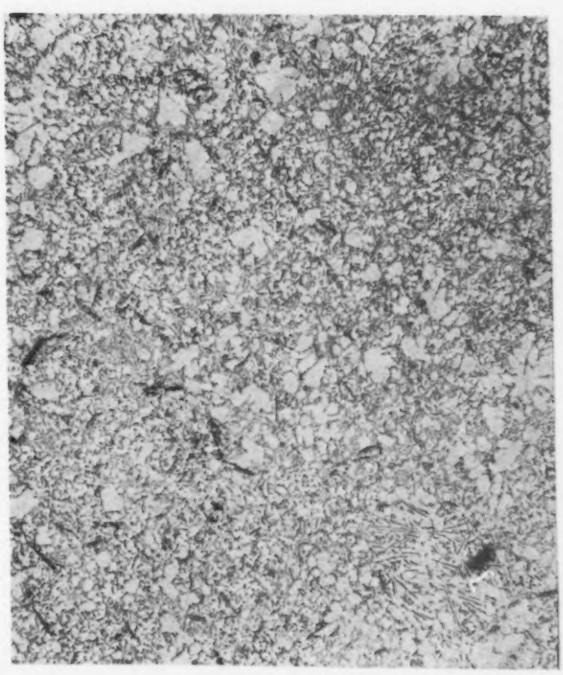
With reference to the failure of diffraction study to disclose the supposedly dissolved gases, the explanation offered was, "It is possible that the specimens examined (in the diffraction apparatus) contained gases and that the gases diffused during the time the specimen was being prepared for examination." Such an explanation is not satisfactory, for if gases were in solution in the metal, the rate of dissipation by means of the effect of Dalton's Laws of partial pressures governing such an action, would be so slow as to require very extended preparation times for any noticeable effect.

That this is so may be substantiated by refernce made by Erickson[3]; "Winterhager demonstrated degassing by cold working and melting in vacuo. Repeated cold working and remelting in a vacuum completely degasses aluminum." He added that Winterhager succeeded in obtaining 150 cc of gas from each 100 of aluminum. In view of this difficult technique of degassing, required to obtain freedom from such contamination, it is rather improbable that in the course of a single stage of cold working, as would be required to prepare a specimen for diffraction study, complete degassing could result.

But if the foregoing facts are viewed in the light of the reactions of carbides, the inconsistencies disappear. If the blisters were formed during heat treatment by reaction between carbides in the castings and the water in the furnace atmosphere, then it is readily seen how metal, which was metallographically dense and not porous to normal X-ray techniques, could develop perceptible bubbles. This too affords a ready, logical explanation of the failure to detect dissolved hydrogen in the diffraction pattern. Perhaps indications might exist, if properly interpeted, of the presence of aluminum carbides, but in all probability these carbides would have been lost in the course of preparation of the specimen, due to reaction with moisture either in polishing or from the atmosphere.

To sum up the difficulties of identifying carbide contamination in aluminum, the following facts are presented. In a lot of diecastings of No. 13, it was found that castings containing as much as 6 pct combined aluminum (in the form of carbides and nitrides), were passing the usual metallographic and X-ray checks. The parts in which excessive nonmetallic inclusions were found were subjected to a potential compression load, in service, of 2000 to 2500 lb and were also subjected to considerable high frequency, high intensity vibration. Therefore, when a lot more than 50 pct rejectable due to porosity, as determined by X-ray study, was en-

FIG. 7—Same alloy as in fig. 6. Note the good, close grained structure, free of porosity and reasonably free of inclusions. The numerous black marks are indications of probable carbides. 250X.



countered, it was decided to test some representative parts to determine the extent of effects of porosity.

Ten good castings, as determined by X-ray study, and ten poor ones were broken in compression. Of the ten nominally good castings, five fractured at loads below 2000 lb (one as low as 400 lb actual compression load) and five others fractured at between 4000 and 5000 lb. The ten porous specimens failed at between 1600 to 2500 lb actual load.

The most significant facts were the color and odor of the five weak castings. They varied from dull gray to jet black. Fig. 1 is an X-ray photo of a supposedly good part, the one which fractured at 400 lb, and fig. 2 represents a porous part which broke at about 2000 lb. Fig. 3 indicates the fracture of a part from sample in fig. 1, that failed at 400 lb (the topmost piece of metal), a piece of a casting which failed at over 4000 lb, and another casting (bottom specimen) which broke at only 700 lb, but which was considered satisfactory under X-ray examination. The two black specimens are placed in their respective positions in fig. 3 to illustrate and to emphasize in contrast with an almost normal fracture (middle specimen) the extent of contamination of the metal. Usual metallographic tests would not have determined the nature of the defects.

X-Ray Examination Inadequate

Fig. 4 illustrates the polished and etched parts shown in fig. 3. Except for a visibly greater concentration of porosity, the lower samples A and B which represent the upper and lower samples in fig. 3, respectively, are but slightly different than the upper specimen C (good metal).

The photomicrograph, fig. 5, indicates the structure of the lower sample in fig. 3. Though there are obvious voids and black inclusions, the usual metallographic report would merely have indicated excessive porosity, and possibly an exceptionally low injection pressure.

Fig. 6, indicating an acceptable sample, shows a nonhomogeneous structure, but is more free of voids and inclusions. By way of comparison, the photo in fig. 7 is of the same alloy cast in another plant in a similar part. This is a good, close-grained aluminum structure, free of porosity and reasonably free of inclusions. The numerous black marks are indications of probable carbides.

The normal chemical analysis of the black metal failed to determine cause of the coloration, because the tests were run merely for specified alloying elements and undesirable metallic impurities. Aluminum content, as is usual, was indicated as the balance by difference. A rerun showed the fallacy of such an analysis method, for the metal in fig. 1 was shown to have 4.15 pct aluminum carbides and nitrides, while the metal in the good specimen, figs. 3, 4 and 6, was shown to contain 0.66 pct combined aluminum. The smell of acetylene was intense when these castings were broken.

The most interesting sidelight of this work indicated that not only is X-ray examination inadequate to exclude weak die-castings, such as those illustrated in fig. 1 (of which there were over 300 units in the single lot of 1200 pieces), but that, specific gravity determinations are for another reason unreliable in preventing inspection approval of porous castings. The badly oxidized parts ranged from a low of 2.30 specific gravity for the sample in fig. 1 to about 2.48, and porous castings, such as shown in fig. 2 ranged from a low of 2.45 to a high of 2.67. However, since the minimum acceptable density is 2.65, very porous castings, breaking at half the required strength, could have been passed by specific density tests alone, just as the oxidized castings escaped detection in X-rays. A further point of interest is that the best metal from the particular source rarely surpassed 2.60, usually ranging from 2.55 to 2.59.

Meticulous Techniques Required

The metal from which the above castings were formed was melted in a direct-fired, oil heated reverberatory furnace. Uncleaned, poorly sorted aluminum turnings and similar machine scrap constituted the bulk of the charge. No effort was made to degrease the metal, and frequently X-ray negatives disclosed the presence of undissolved fragments of austenitic stainless steel. No fluxing or cleansing operations were attempted. The molten metal was transferred from the 30,000-lb furnaces directly to the injection machines. The injectors originally were built to handle zinc, and though redesigned for war work, were incapable of exerting more than 3000 psi pressure. Such metallurgical practices were such as to emphasize every contributing factor in the formation of carbides and nitrides of aluminum and of the alloying elements which probably included an appreciable percentage of calcium.

In the light of the foregoing discussion, it is necessary that causes of porosity in aluminum be reconsidered. Why is it that water vapor causes blistering of many aluminum alloys during heat treatment? The mechanics of blistering is not of such nature that it is due to mere expansion of contained gases, to the "exclusion of the liquid phase," or to any conceivable reaction with water which might contaminate the hot, but solid metal in such a way as to liberate hydrogen from the aluminum, nor is it usually due to overheating. When viewed in the light of knowledge of known chemistry of active carbides and nitrides, the mechanics of blistering of aluminum in the presence of water at elevated temperatures is immeasurably simplified.

New Analytical Methods Required

It therefore appears necessary that new methods of metallurgical chemistry must be developed to permit ready isolation and identification of relatively minute amounts of active nonmetallic constituents. Further, melting and purification methods must be revised to minimize the tendency for active carbides or nitrides to form.

(CONTINUED ON PAGE 141)

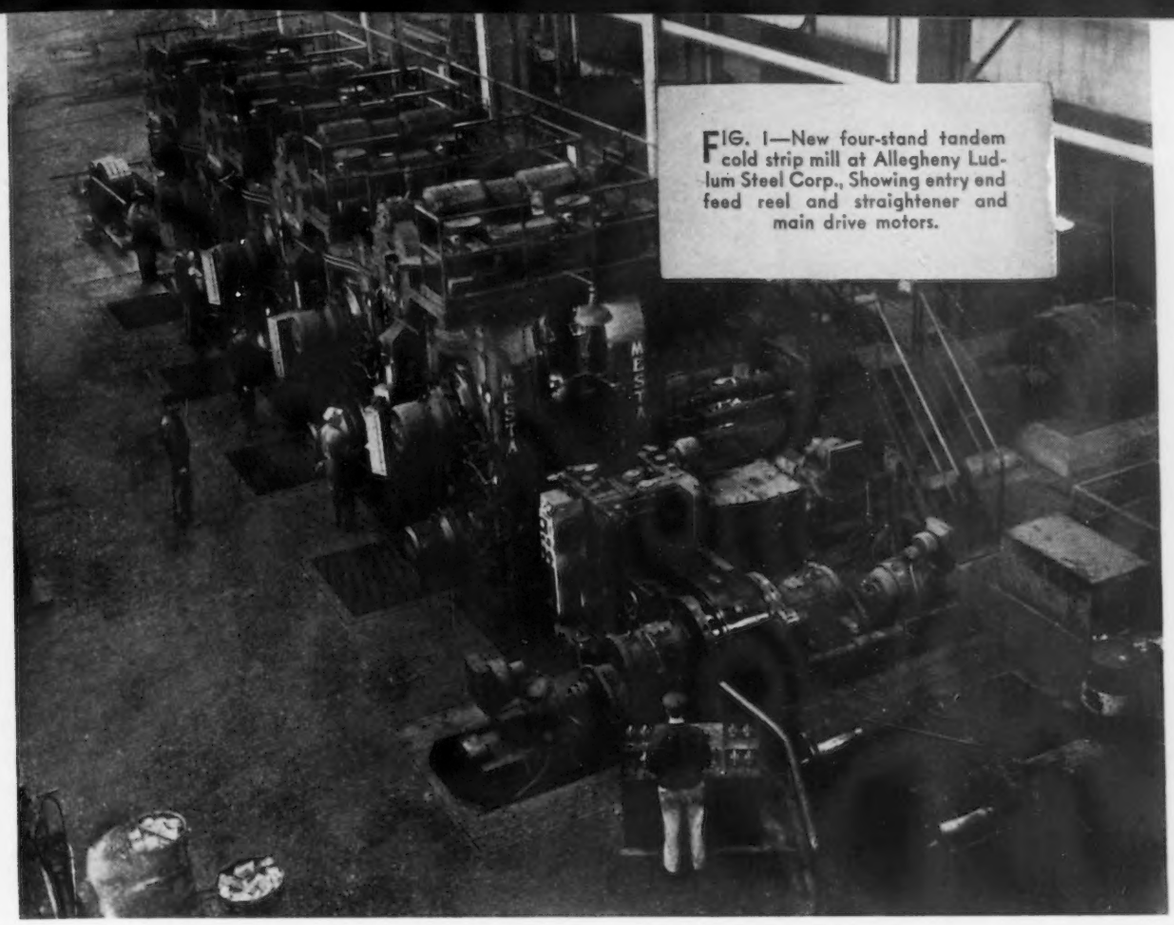


FIG. 1—New four-stand tandem cold strip mill at Allegheny Ludlum Steel Corp., Showing entry end feed reel and straightener and main drive motors.

New Silicon Strip Cold Mill

Featuring an extensive use of controls in the cold rolling of high silicon electrical sheet and strip, and other alloy steels, a four-stand tandem mill has recently been installed at the West Leechburg plant of the Allegheny Ludlum Steel Corp. A description of the mill, which contains amplidynes and special exciters for certain control functions, a full complement of indicating and recording meters, inertia compensation, tapered tension, indicating tensiometers, and automatic tension control between the last stand and the reel, is presented in this article.

By F. R. GRANT

Steel Mill Div., General Electric Co., Schenectady

TO help meet the heavy postwar demand for high silicon electrical sheet and strip, the Allegheny Ludlum Steel Corp. has installed a tandem, cold rolling strip mill at the West Leechburg plant. Although this mill is primarily for producing these steels, it is also suitable for rolling other alloy and stainless steels. The new mill, shown in figs. 1 and 2, was produced by Mesta Machine Co. and the electrical equipment for it supplied by the General Electric Co.

The new mill is a four-stand, four-high, 28-in. wide, tandem cold strip mill with winding reel, feed reel, and entry straightener. Work rolls are 11.25 to 12.5 in. in diam and the backup rolls are 40 in. diam. The maximum delivery speed from the fourth stand with 12½-in. diameter rolls is 920 fpm.

The feed and winding reels are designed to handle coils having a core or inside diameter of 20 in. and an outside diameter of 60 in. Coils of these dimensions, with a width of 24 in., weigh approximately 15,000 lb.

The essential data pertaining to motors, gear ratios, etc., which determine the operating limits of the mill, are indicated in table I.

Fig. 3 shows the available speed cone giving the maximum and minimum operating limits for each stand at 600 v. Any rolling schedule must

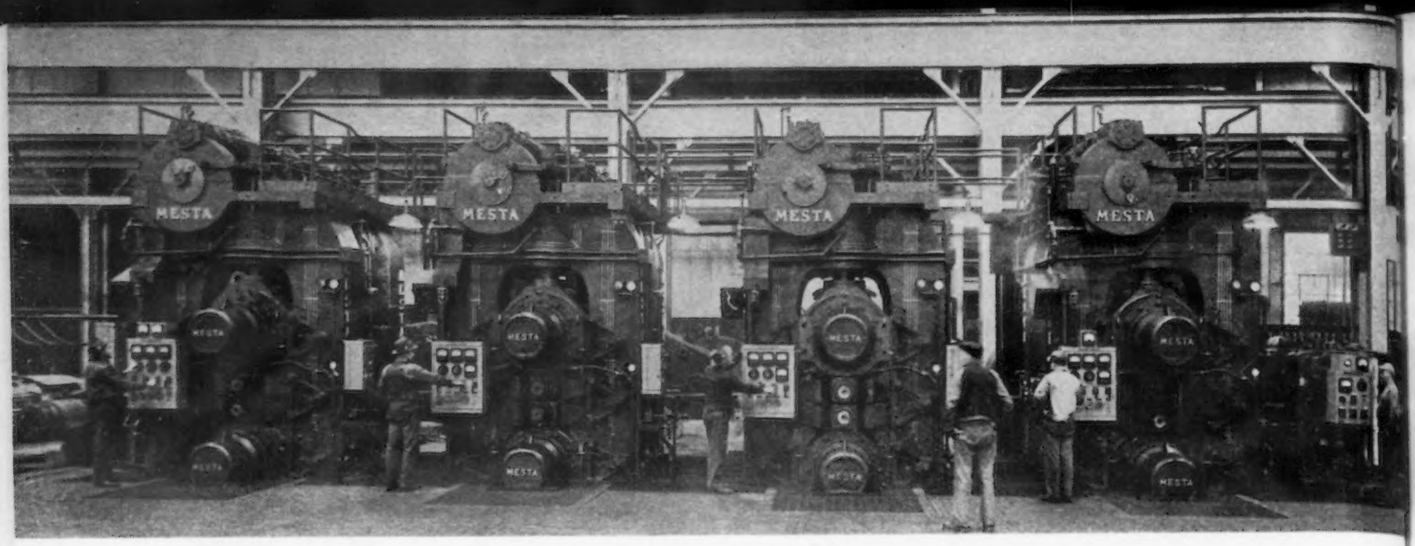


FIG. 2—The four-stand tandem cold strip mill viewed from the operating side, showing control and instrument cabinets mounted on mill housings.

fall within these limits; although it is apparent that the entire mill can be operated at reduced voltage, thus lowering both the maximum and minimum speed limits. Calculation of a number of rolling schedules determined that the mill would meet all anticipated rolling requirements.

Power for the operation of this mill is supplied at 25 kv, 3 phase, 60 cycles, to an outdoor substation where it is stepped down to 2400 v by a 10,000-kva transformer bank. From the outdoor substation, 2400-v power is delivered to the mill substation where a metal-clad switchgear equipment provides control, metering, and distribution to the various circuits.

Main Motor-Generator Set

A 5400-kw motor-generator set, fig. 4, converts power from 2400 v 3-phase, 60-cycle ac, to 600 v dc for the operation of the mill.

This set consists of:

(1) Two 2500-kw, 600-v dc generators which supply power to the four main mill motors.

(2) One 400-kw, 600-v dc generator which supplies power to the winding reel motor.

(3) One 150-kw, 250-v constant potential exciter for excitation and general 250-v control power requirements.

(4) One 7500-hp, 0.8-pf, 514-rpm, 2300-v, 3-phase, 60-cycle, synchronous driving motor.

Temperature detector coils are imbedded in the stator windings of the synchronous motor to measure internal temperatures and to protect against overheating. Space heaters are installed in all main machines and may be energized when the equipment is shut down to prevent condensation of moisture on the machine windings. Neutral reactor starting is employed to reduce the starting inrush to the lowest practical value.

The two 2500-kw generators are paralleled through individual positive and negative circuit breakers, and are connected to the mill motors by copper bus, approximately 200-ft long. Cable connections consisting of one 750-mcm cable per polarity are used between the 400-kw generator and the reel motor. All of these leads are carried through a tunnel from the substation to the mill. This tunnel is also utilized to deliver ventilating air to the mill and reel motors.

Prolongs Equipment Life

The mill and reel motors, as well as the main machines of the motor-generator set, are arranged for forced ventilation of the updraft, nonrecirculating type. The machines are equipped with enclosing covers, designed to admit air from underneath and discharge it into the room after passing through the machines.

Ventilating air is supplied by three motor-driven blowers, each rated 40,000 cfm at 3 in. static pressure. Two capillary type air washers, each rated 55,000 cfm, clean and cool the ventilating air before it is delivered to the machines, thus insuring a continuous supply of clean, cool air for all machines and thereby reducing to a minimum the accumulation of dirt or foreign material in the equipment. It is expected that this will prolong the life of the equipment as well as reduce the required maintenance to a minimum.

The load on the 7500-hp synchronous motor of the main motor-generator set is necessarily of a fluctuating type, building up to a maximum of possibly 12,000 hp while a coil is being rolled, and dropping to a very low value between coils. This wide variation in load would cause considerable variation in the voltage of the 2300-v system, if the field of the synchronous motor were excited at a constant value as required for the maximum load conditions.

In order to overcome this voltage variation as much as possible, a power factor regulator is provided to change the field excitation of the synchronous motor in proportion to the load being carried. This regulator can be used to hold either constant power factor or constant reactive kilovolt-amperes throughout any range of load within the capacity of the motor. A separate 40-kw, 250-v exciter is provided for the synchronous motor and the regulator controls the field of this exciter to increase or decrease the voltage, and hence the excitation of the motor, in proportion to the load on the motor.

The control for the mill incorporates all features which have been found advantageous in mills of this type. These include amplidynes and special exciters for certain control functions, a full complement of indicating and recording meters, inertia compensation, tapered tension, indicating tensiometers, automatic tension control between the last stand and the reel, etc.

Amplidynes and exciters—Control of this mill is of the well-known adjustable voltage (Ward Leonard) type in which the acceleration and deceleration of the motors are governed by changing the generator voltage.

Many of the control functions are obtained by means of auxiliary exciters having special inherent characteristics as required for this particular application. Several of these exciters are of the amplidyne type which is ideally suited to the control of certain functions in mills of this type.

Counter-emf exciters with special field characteristics are used to regulate the fields of each stand motor. These machines are connected in series with the motor fields and either buck or boost the applied excitation voltage to regulate the field strength of each motor.

Conventional dc motors are employed for the main generator exciter, the feed reel generator, the straightener booster, and for voltage control of the main generators.

Amplidyne type motors are used as follows: One as an auxiliary exciter for the main generator field exciter through which the main generator voltage is controlled and the pump back current during retardation is limited to safe values; one as a forcing exciter to provide inertia compensation during acceleration or retardation; two as counter-emf exciters for the winding and feed reel motors; and two as amplifying exciters for tension control in connection with the feed and winding reels.

Metering—As will be noted in fig. 2, control cabinets are located on the mill housings in which are mounted all necessary control devices such as master switches, pushbuttons, rheostats, etc., for the operation of the mill, together with a full set of indicating meters, thus making it possible for the operator to observe the load, voltage, speed, tension, gage, and other mill conditions, at any time.

On the control panel in the substation is a set of nine recording meters for registering delivery speed, motor and generator amperes, and bus voltage. Each of these recording meters is equipped with a control switch by which it may be started and stopped individually and, in addition, a switch is provided by which the charts of all meters may be started or stopped simultaneously. This latter feature is of considerable convenience when it is desired to obtain simultaneous recordings on all meters. Each meter is provided with chart speeds of 3 in. per hr and 3 in. per min, thus making it possible to obtain clearly legible recordings for short periods of time on the high-speed adjustment, or continuous recordings over long periods of time on the slow-speed settings.

Charts from these meters are valuable as means of checking the performance of the mill,

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FIG. 3—Curves indicating the available speed cone, giving the maximum and minimum operating limits for each of the four stands, at 600 v.

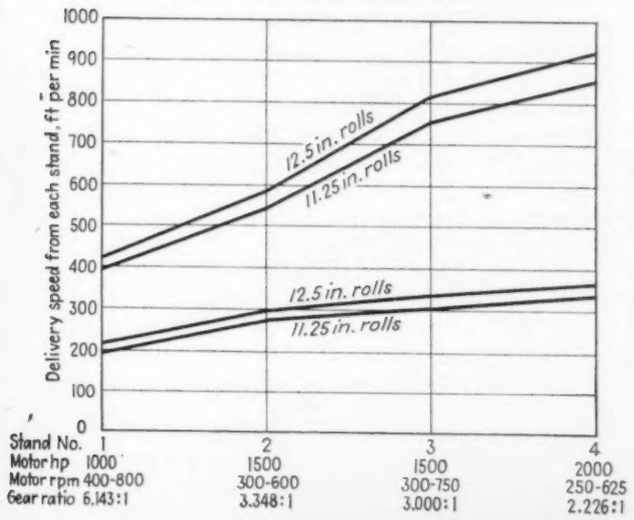

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FIG. 4—Main dc control equipment for four-stand tandem cold strip mill including control of two 2500-kw, 600-v generators, four mill stand motors and one reel motor.

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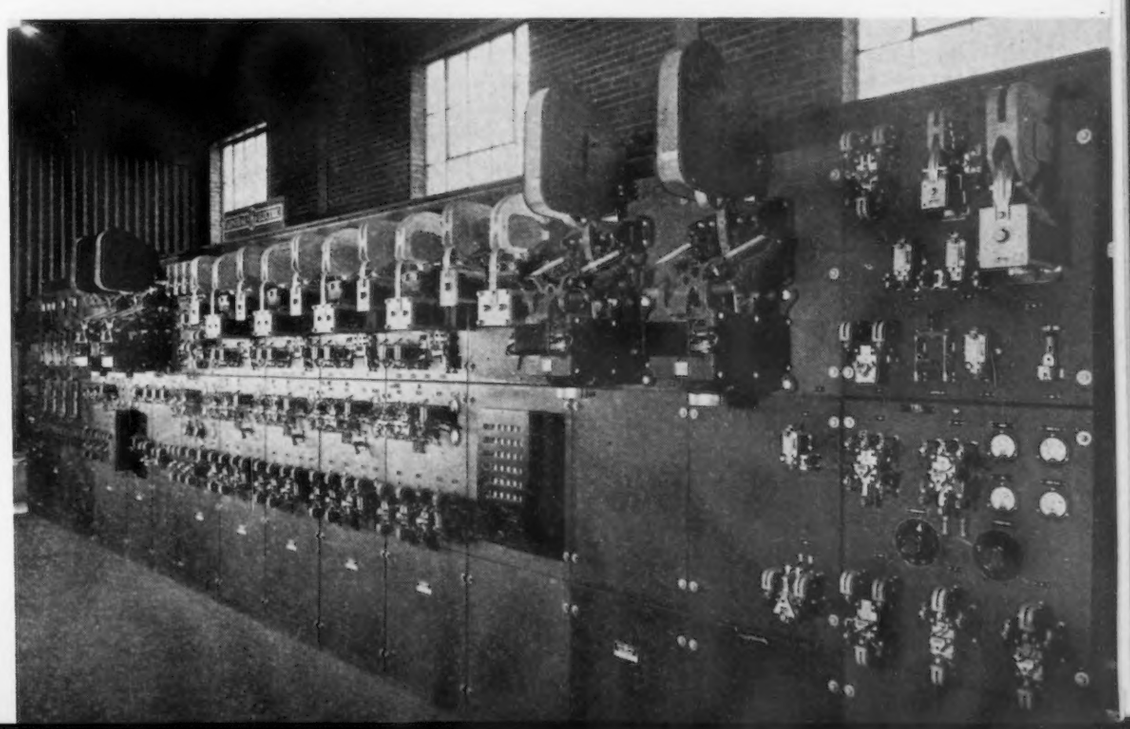


making adjustments, analyzing troubles, and determining power demand or consumption.

Inertia compensation—The effective wk^2 of the rotating parts of the four stands is necessarily different because of the different size and speed of the motors, gear units, pinion stands, etc. There will, therefore, be a tendency for the stands having the lower values of wk^2 to accelerate or retard faster than those having higher wk^2. In order to properly maintain the tension in the strip between stands during acceleration or retardation, it is necessary that all four stands accelerate or retard at the same rate as the generator voltage is built up or down.

In order to compensate for the different values of wk^2, a system of forcing is provided by which the fields of the motors may be temporarily weakened or strengthened to obtain approximately equal rates of acceleration or retardation for all four stands. This forcing function is obtained by means of a small amplidyne exciter whose armature is connected across auxiliary fields of

TABLE I
Operating Characteristics of Allegheny Ludlum New Cold Mill

Roll Stand	Motor Hp	Motor Speed, Rpm	Gear Ratio	Delivery Speed, Fpm	
				Min, 11.5-in. rolls	Max, 12.5-in. rolls
1	1000	400-800	6.143:1	196	427
2	1500	300-600	3.348:1	270	586
3	1500	300-750	3.000:1	301	816
4	2000	250-625	2.226:1	338	920
Reel	400	300-1200	6.667:1	...	...
Feed Reel(2)	10	400-1600	22.18:1	...	...

the counter-emf exciters for stands, Nos. 2, 3, and 4, and whose control field is excited from the secondary of a transformer, which is in turn excited from the output voltage of the main 2500-kw generators. Since this transformer will develop voltage on its secondary winding only while the voltage across its primary is changing, it is evident that the forcing exciter will be effective only while the mill is being accelerated or retarded. Adjustments are provided so that the degree or forcing may be individually adjusted for each mill motor and, in addition, means are provided so that the amount of forcing may be different while accelerating or retarding.

Tapered tension—It is a well-known fact that in the cold rolling of steel, the gage will vary with the speed of the mill, all other factors remaining the same. If the speed is increased, the gage will decrease and if the speed is decreased the gage will increase. Therefore, to reduce off-gage material to a minimum, it is important that means be incorporated in the control of a mill of this type to offset insofar as possible this natural tendency for the gage to change with changes in speed. One means of attacking this problem is by changing the tension in the strip as the speed changes; increasing the tension as the speed is decreased, and decreasing the tension as the speed is increased.

In the Allegheny-Ludlum mill this is accomplished by changing the field strength of some of the motors by means of auxiliary fields on the counter-emf exciters. The No. 1 mill stand is designated as the base or pivot stand and is not affected by the tapered tension control. As the mill is retarded, the fields of the other three stands are regulated in such a manner that they tend to run relatively faster than the pivot stand, thus developing more tension in the strip than was held when the mill was running at higher speed. This effect is obtained by means of a dial on the main generator rheostat which controls auxiliary fields of the counter-emf machines for motors Nos. 2, 3, and 4.

When the mill is being accelerated, the tapered effect will be reversed and the tension in the strip will gradually decrease as the mill speed increases. This tapered effect is individually adjustable for each stand and the most advantageous setting must be determined by trial.

It has been found that tapered tension can be advantageously used only within certain limits. If too much taper is used, it will increase the tension to such an extent that breakage may occur and the loss in scrap material will exceed the off-gage loss which would be produced if less taper were used. The amount of taper to use will depend on various factors, such as, type of steel being rolled, condition of the edges, etc. The operator must learn by experience how much taper any given rolling schedule will stand.

Tensiometers Eliminate Strip Breakage

To make the fullest use of tension in the maintenance of gage, it is necessary that the operators have means of determining the actual tension in the strip at all times. The tensiometer is a device for measuring the tension and giving a continuous indication on a meter. The three double-ended tensiometers used, one between each pair of stands, aid the operators by indicating tension values at all times; thus permitting them to roll at the most advantageous value consistent with good quality and gage, without fear of strip breakage. They are especially advantageous in making adjustments for tapered tension, since they indicate directly how much increase in tension is obtained as the mill is retarded.

Means for accurately holding tension between the last stand and the reel is important in the production of prime strip. It is highly desirable that tension be maintained while the mill is being accelerated or retarded, at standstill, and also while running at constant speed.

Under constant speed conditions, the armature current of the reel motor is a direct measure of the tension in the strip (neglecting friction). The voltage drop across a section of resistance in the armature circuit of the reel motor is amplified by means of a small amplidyne machine and used to regulate the voltage of the counter-emf exciter in the reel motor field circuit. This regulates the field of the reel motor to maintain constant armature current, and hence constant tension in the strip, as the diameter of the coil changes.

In order to hold the same tension in the strip while the mill is being accelerated, as when run-

ning at constant speed, it is necessary to temporarily bias the tension control to permit it to hold a higher value of current. This excess current, required to accelerate the reel, the motor armature, and the gears, is dependent upon the inertia of these parts and the rate of acceleration.

When retarding the mill, the stored energy in the rotating parts tends to increase tension, so it is necessary to reduce the armature current of the reel motor in order to maintain constant tension.

Provision is made in the control for "forcing" the tension regulator to accomplish these results. This forcing action is effective only while the main rheostat is in motion for either increasing or decreasing the speed of the mill. The forcing action is adjustable in each direction, thus making it possible to compensate for different rates of acceleration or deceleration.

The mill is equipped with a feed reel of the double cone clamp type at the entry end for holding back tension in the strip. This feed reel is powered by two 10-hp, 400 to 1600-rpm, 250-v, dc motors, one of which is geared to each cone. Each motor is provided with forced ventilation by means of motor-mounted blowers and filters. The blowers are each driven by a 220-v, 3-phase, 60-cycle induction motor.

A 20-kw, 1800-rpm, 250-v feed reel generator is included on one of the auxiliary exciter sets. The voltage of this generator is controlled in the same manner and simultaneously with that of the main mill and reel generators. The control for the feed reel functions on the same principles as that for the winding reel, and provides the same adjustments and operating features.

Straightener Insures Proper Threading

A straightener leveler, installed between the feed reel and the first mill stand, is utilized to straighten and level the front end of the coil and feed it into the No. 1 stand for threading. This not only relieves the operators of a difficult task but also insures that the end of the strip is in condition for threading.

The straightener is driven by a 40-hp, 600 to 1200-rpm, 600-v dc motor, which receives its power from the main mill generator. The speed of the straightener will, therefore, automatically maintain a predetermined relationship with that of the mill. A 20-kw, 250-v bucking generator is connected in series with the straightener motor armature to give a measure of speed control by voltage in addition to the motor field control. Provision is made for jogging the straightener independently of the mill and it may be started at any time even though the mill may be in operation. When the strip has been threaded into the first mill stand, the screws of the straightener are raised to disengage it from the strip, and the straightener is not used until the next coil is threaded.

The mill is provided with the usual auxiliary drives for the screwdowns, reel wedge, hydraulic systems, lubrication systems, roll coolant system, mineral oil pump, and ventilating fans and pumps. The screwdown and reel wedge drives are 230 dc, while all others are 440-v, 3-phase, 60-cycle, induction motor driven.

Each induction motor is controlled by a standard combination magnetic starter while the screwdowns and reel wedge motors are provided with standard dc mill type auxiliary control.

The 220-v power for the ac auxiliary drives, lighting, and miscellaneous purposes is provided by two 500-kva, 2300/220-v unit substations. Each unit is entirely self contained with metal-clad switchgear. The incoming line is brought in through a conduit to an enclosure on the high voltage side of the transformer. The low voltage leads of the transformer are carried through a metal throat directly into the switchgear assembly where air circuit breakers are provided for the distribution circuits.

. . . NEW BOOKS . . .

"The Heat-Treatment of Steel," by Edwin Gregory and Eric N. Simons. The authors of this book deal with temperature measurement and control, pyrometers and thermocouples of various types; gas, electric and oil-fired furnaces; refractories and equipment; and the principles and processes of heat-treatment and their application to every type of steel production. The book is written for students with some theoretical background and the working heat-treater. Pitman Publishing Corp., 2 W. 45th St., New York 19. 358 p. $4.00.

* * *

"The National Paint Dictionary," by Jeffrey R. Stewart. Third edition provides information of interest to manufacturers, distributors and industrial consumers of protective and decorative coatings. It is not intended to be a scientific manual of an encyclopedic nature but it is intended to fulfill practical needs for those concerned with paint finishes. Stewart Research Laboratory, P.O. Box No. 173, Benjamin Franklin Station, Washington. 704 p. $7.50.

* * *

"Handbook of Industrial Electroplating," by E. A. Ollard and E. B. Smith. An English text in which the authors have attempted to include as much data as possible relating to the electroplating industry. The book is intended for those concerned with design, erection, maintenance and operation of electroplating installations as well as for laboratory workers. The Louis Cassier Co., Ltd., Dorset House, Stamford St., London, S.E.I. 308 p. $3.00.

* * *

"Fluorescent Lighting Manual," by Charles L. Amick. Second edition of this book covers the principles of operation, the design, construction and performance characteristics of all types of fluorescent lamps. It provides manufacturers, contractors, dealers and users with a reference manual on installation and servicing procedures and includes an explanation of the glare rating system and a discussion of the acceptability of bare lamp installations. McGraw-Hill Book Co., 330 W. 42nd St., New York 18. 318 p. $4.00.

Continuous Casting Research Planned By British

DEVELOPMENT of a continuous casting process for steel is among the projects to be investigated at the new Physics Dept. of the British Iron & Steel Research Assn. The recently opened laboratory is broadly concerned with the physical properties of steel and the materials used in steelmaking. The department is investigating the characteristics of steel at temperatures above 2200°F in an effort to improve present casting methods and in the hope of developing a continuous casting process. To this end, the heat transfer from steel through the mold is being studied by examining the variation of temperature with time after pouring steel into special fixed-position molds. This practice corresponds to varying the temperature with distance along the mold in the continuous casting process.

A similar study is in progress to investigate the strains developed at various points on ingot mold walls following pouring. A six-point thermocouple signal recorder of high scanning speed has been constructed for use in this study. It automatically switches the thermocouple signals in sequence into a standard Tinsley dc amplifier and pen recorder. This allows the six thermocouple readings to be plotted in as many seconds on a single recorder chart.

Because of the interesting results obtained from a study of the bessemer flame by spectrographic methods, a thorough investigation is to be made by the department of the flames occurring in all steelmaking and blast furnaces. Such research is expected to be valuable in examining the fundamentals of combustion in furnaces and may lead to the development of improved quality control methods. A photo-electric indicator has been developed in an attempt to control side-blown converters through observation of their flame spectrums. This unit gives a selective response to special lines appearing in the region of 4000A, being designed on the basis of indications that the appearance of a manganese resonance line at 4033A might be capable of correlation with the progress of a blow.

The churning action of the air blast on liquid steel in these side-blown converters is being studied by the British Physicists in a ⅛-scale model converter of transparent plastic construction. This converter model is shown in fig. 1.

A tension meter has been developed for continuous measurement of tension in wire passing through a drawing machine. The principle is that the frequency of free oscillation of a wire, whose length and mass per unit length are known, is a direct function of its tension. The wire is electrically maintained in vibration at its fundamental frequency and the vibration is measured by an electronic frequency meter.

FIG. 1—Model of a side-blown converter is shown in operation. It is made of transparent plastic to permit study of the churning action of the air blast.

Thermal properties of flames are being examined using a sensible heat meter which measures the heat content per unit volume of furnace gas and can be used where gas temperatures are too high for direct measurement. A value for the total radiation from the flame in an openhearth furnace may be obtained by a front wall pyrometer which indicates to the operator the rate at which the furnace is working. A mirror type total radiation pyrometer of standard design but reduced size can be installed in a protected position in such a way that the cone of vision is completely filled by the flame backed by hot brickwork. The choice of a suitable portion of the flame to sight on has been investigated.

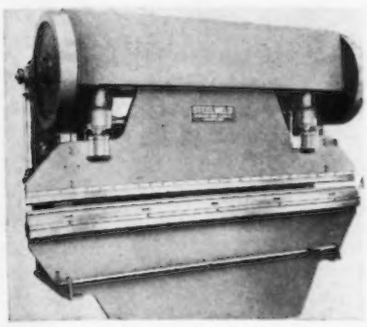
Another project to be undertaken is the study of the flow of air and gas in an openhearth furnace, since it has been shown that the mixing conditions have a very marked effect on thermal efficiency. The frictional pressure losses which occur in the gas uptake and gas port have been measured. The experiments have shown that it is impossible to reduce the frictional pressure losses very greatly and that any substantial increase in gas velocity must be brought about by using a higher gas pressure behind the port. This work will be extended to an investigation of the effect of furnace design on the mixing of gas and air within the furnace chamber.

New Equipment . . .

A new 500-ton press featuring a 20-ft bed capable of handling steel plate up to 20 ft x 3/8 in., a mold and die milling machine with a hydraulic tracer mechanism, and a new line of heavy punch presses are featured herein. Also included are a new ac Heliarc welder, dust collecting equipment, a coolant temperature control unit and other new developments.

Bending Press

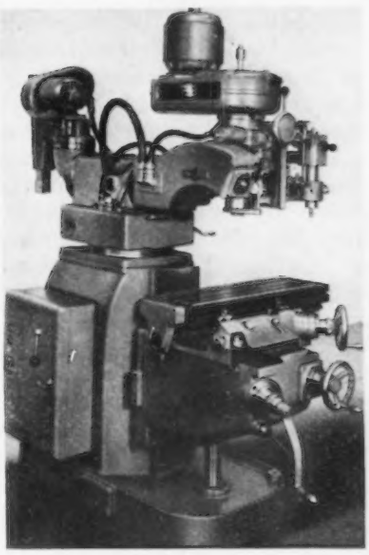
FEATURING a 20-ft bed and ram which permits bending steel plate up to 20 ft x 3/8 in., or 14 ft. x 1/2 in., a 500-ton press has been added to the Steelweld bending press line manufactured by



Cleveland Crane & Engineering Co., Wickliffe, Ohio. Twenty-one-inch bed extensions on both ends make possible horning operations. To minimize deflection and assure accuracy, the bed extends 42 in. below the floor. A two-speed machine which can be operated at either 7 or 20 strokes per min, the press is equipped with tonnage indicators on both ends that show the loading to which the machine is subjected. A clutch knock-out mechanism disengages the clutch when the press is overloaded. The machine is operated by a mechanical foot treadle, but air-electric control can be provided. Steelweld presses are available for bending, forming, blanking, drawing, rubber-forming and multiple-punching.

Die Milling Machine

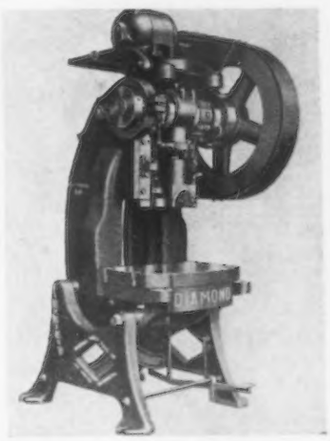
FOR the production of plastic molds, permanent molds, metal patterns, die casting dies and small drop forging dies, *Cincinnati Milling Machine Co.*, Cincinnati 9, has produced an 8x18-in. tool and die milling machine. A sensitive hydraulic tracer mechanism is said to provide automatic duplication of intricate shapes with a high degree of accuracy. Tracer finger contact is light to permit the use of wood, plaster of paris, or other soft materials for the master shape. The spindle carrier is mounted on a transversely adjustable ram with a slotting attachment mounting. Double swivel arrangement of the spindle head in which the head swings on segments of circles, the centers of which lie close to the tip of the cutter, is said to make possible a wide range of angular mill-



ing jobs. The general structure of the machine is of the knee and column type, the column being truncated to provide for the turret and ram type mounting of the spindle head. Ten speeds are available, ranging from 225 to 4000 rpm. The spindle is driven by a single V belt and speed changes are made by means of a two-speed motor and a pair of five-step sheaves.

Punch Presses

PLAIN type punch presses in 55 and 56-ton capacities, designed to strain gage analysis, have been announced by *Diamond Machine Tool Co.*, Los Angeles 23. Both punch press frames are of open-back, inclinable construction, frame sections being designed to provide increased strength at points of maximum stress, as shown by the



strain gage analysis. All bearing and sliding surfaces are micro-finished. The clutch employs three sets of driving dogs engaging flywheel at any 120° angle of rotation. The 56-ton model has maximum stroke of 100 per min. Standard stroke is 3 in.; bed area, 20 x 30 in.; bed opening, 12⅝ x 16½ in.

AC Heliarc Welder

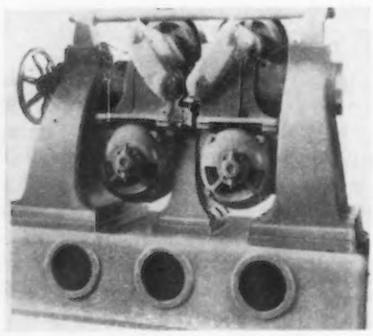
DESIGNED for use with Heliarc equipment as supplied by Linde Air Products Co., using helium or argon for inert-gas-shielded welding, an ac welder has been announced by *Hobart Bros. Co.*, Troy, Ohio. The machine is suitable for welding magnesium alloys, aluminum, stainless steels, high carbon and other alloy steels, brass, Monel and other hard-to-weld metals. In addition to Hobart's standard ac welder features, this model TIH-300-s embodies high frequency stabilization to insure easy starting and dependable maintenance of the gas-shielded arc with practically no rectification of the

ac current passing through it. A window is provided through which the spark gap may be observed. A foot pedal starts the arc through the tungsten electrode, and simul-

taneously opens the valves permitting the shielding gas and the cooling water to flow through the special torch. Releasing the pedal breaks the arc but permits gas and water to continue flowing for a predetermined length of time, which is adjustable up to 180 sec.

High-Speed Derodder

MODEL GA 1 high-speed derodder, or mandrel reliever, has been offered by *Glengarry Machine Works, Inc.*, Bay Shore, N. Y., for relieving the tubing in mandrel drawing, after the tube and mandrel have passed through the die. The machine, operating at speeds up to 120 fpm, will handle ferrous



tubing in sizes up to 7/8 in. in diam with wall thicknesses up to 0.065 in., and nonferrous tubing in diam up to 1 in. Transmission runs in oil. Simple micrometer adjustments, when once set, require no further attention. For light work, especially on irregular lengths of tubing, the tie bar may be quickly removed.

Variable Speed Motor

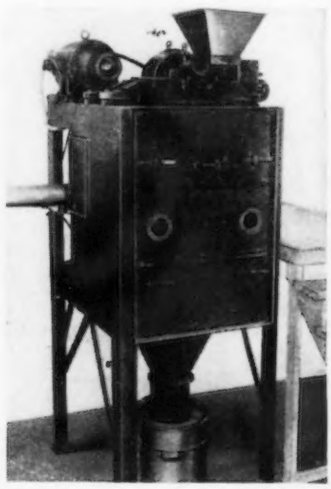
DESIGNED to maintain constant maximum torque at all speeds, a variable speed motor announced by *Guernet Electrical Machinery, Inc.*, Meriden, Conn., is variable from 1500 to 6000 rpm, giving adjustable, stepless speed control. A lever stops and starts the motor and mechanically controls a pair of centrifugal vibrating contacts which accomplish the speed variation. The motor is 1/5 hp, ball bearing, universal wound, reversible, 115 v, single phase, any frequency, and is approx 9 x 7 x 5 in. It is suitable for precision drilling, grinding, buffing, polishing, utility and general laboratory work.

Variable Speed Control

THE Dyna-Link, an electronic system designed for speed control of variable speed transmissions, has been announced by *Yardeny Laboratories, Inc.*, 107 Chambers St., New York 7. This system is said to permit maximum use of production facilities, especially where mixing or batching processes are involved. The Dyna-Link consists of a master control, the controller and a speed measuring generator. When the operator sets the master control to the desired speed setting, the controller energizes the pilot motor in the proper direction for adjusting the speed changer until the actual output speed corresponds to the master control setting. If the drive slows down due to load increase, it is stated that the controller automatically detects the difference in speed and corrects the adjustment. A precise ratio of speed between several isolated loads on material conveyers can be maintained, it is said, by using a Dyna-Link control on each conveyer.

Dust Collector

THE Mikro-Collector dust collecting unit, manufactured by *Pulverizing Machinery Co.*, Chatham Road, Summit, N. J., employs hard-pressed wool felt as a filter medium for industrial air and gas filtration. To prevent clogging, a hollow annular blow ring is employed which hugs and flexes the cylindrical felt bag while moving up and down its outer surface by means of conventional chain and sprocket drive. Around the periphery of the blow ring is a narrow slit through which is directed a jet of air supplied by a positive pressure blower. This counter current of



air is conveyed to the blow ring by a flexible hose and is said to assure a perpetually clean bag; no portion of the filter surface need be cut off for cleaning or shaking during filtering operations. The manufacturers claim 99.99 pct minimum recovery of most solids. The system is also claimed to effectively handle dusts containing a high percentage of moisture or oil. In the standard single bag collectors, the cylindrical felt bag is centered in an air-tight steel or aluminum housing.

Gas-Air Mixer

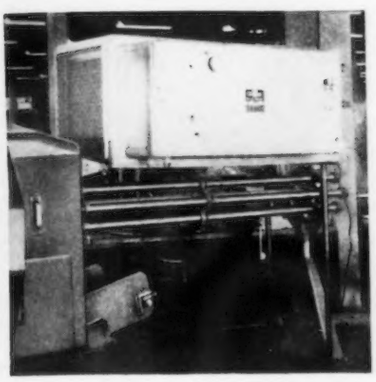
FOR the industrial gas field, *Gas Appliance Service, Inc.*, 1211 Webster Ave., Chicago 14, has marketed a gas-air mixer which

permits such features as visible operation. The mixer is designed to pre-mix any commercial gas with air in any desired proportion and in any desired quantity within the capacity of the unit. This mixture is delivered to the burners under

constant pressure. With this mixer, accurately controlled combustion mixtures are claimed for all types of heating processes. Close temperature control, high heat input, practically unlimited turn-down range, high burner pressure and any desired flame characteristic are stated to be other features. Applications particularly suited for this unit are said to be automatic brazing and soldering operations, flame hardening, atmosphere units requiring accurately controlled atmosphere gas, and furnaces utilizing a high rate of heat input. The mixture ratio is independent of fluctuations in gas pressure or changes in output demand. The mixer is available in five models of capacities from 3000 to 18,000 cu ft per hr.

Coolant Temperature Unit

PRODUCTION of a coolant temperature control unit for application to New Britain-Gridley automatic screw machines has been



announced by *Niagara Blower Co.*, 405 Lexington Ave., New York 17. The unit is said to increase production by eliminating warm-up operations and subsequent tool adjustments. When the screw machine is operating the coolant is kept at a predetermined temperature by the evaporation of moisture on the outside of tubes through which the hot coolant oil is flowing. This method is said to remove 1000 Btu per lb of water evaporated. When the machine is stopped, a fall in the coolant temperature is prevented by the automatic operation of an electric element. Temperature of the coolant is said to be always within 2 or 3° of a predetermined point. The unit can be adapted to all multiple spindle automatics.

Plug Valves

DEVELOPMENT and production of an advanced design of lubricated plug valves have been announced by *H. K. Porter Co., Inc.*, 1932 Oliver Bldg., Pittsburgh 22. These valves are said to assure complete and leak-proof shut-off, elimination of leaks through the stuffing box, ease of operation, and trouble free service. The design is applicable to manufactured and natural gas operations, refinery installations, oil production, and the chemical and processing industries. The valve is available in semi-steel, carbon steel, alloy and stainless steels.

Hand Tachometer

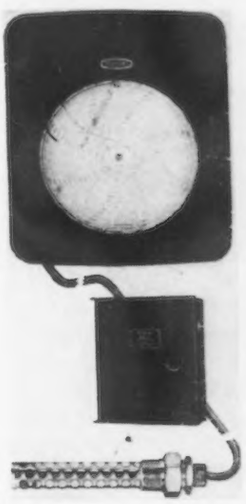
DESIGNED to give direct readings of linear speeds from 10 to 10,000 fpm, and of rotational speeds from 100 to 10,000 rpm, a hand-held electric tachometer weighing 3 lb, has been announced by the Special Products Div., *General Electric Co.*, Schenectady 5. The instrument consists of two units, the head which is placed in contact with the moving object and the indicating unit to which the head is attached by a flexible electric cable. Speed ranges can be changed while the spindle is rotating because there is no gear transmission to shift for various speed ranges. Accurate speed indications are assured by a low driving torque of ¼ oz-in. Vibration from the rotating machine does not affect the reading, it is said. The tachometer can measure both clockwise and counter-clockwise rotation.

High-Frequency Converter

A 20-kw Ajax-Northrup high-frequency converter for induction heating and melting, announced by *Ajax Electrothermic Corp.*, Ajax Park, Trenton 5, N. J., features simple controls, safety interlocks, and streamlined housing. All parts are enclosed in one compact, semi-portable unit that measures 44 x 44 x 58 in. Only one knob is needed to adjust the converter to the proper power output when connected to an Ajax-Northrup metallurgical furnace or heating coil. The electrical circuit of the converter is self-tuning, with frequencies varying from 20,000 to 80,000 cycles per sec. A watt meter and starting push button are mounted on the front of the housing. The unit is said to have a wide field of application in laboratory and commercial heating and melting; is suitable for steel melting up to 30 lb; for brass and bronze alloys in melts up to 60 lb; and for melting precious metals. Heating applications include brazing, hardening, soldering, etc. Power supply to the converter is single phase, ac, usually 208, 220, or 440 v.

Dew Point Recorders

DEW point recorders and recording controllers for industrial use have been manufactured by *The Foxboro Co.*, Foxboro, Mass. These instruments are designed for use in blast furnace operation, air conditioning, gas distribution, foundry cupolas, and dryers. The measuring element, the Dewcel, is a central tube containing the thermal bulb, wrapped with a saline-saturated woven glass tape and two windings of silver wire to conduct the heating current. Moisture determination is based on the fact



that for every water vapor pressure in contact with a saturated salt solution there is an equilibrium temperature at which the solution neither absorbs nor gives up moisture to the atmosphere. The variable heat supply brings the measuring element to this equilibrium temperature. This temperature, measured by the thermal bulb, is transmitted to the recording instrument, and is read on the chart in degrees of dew point temperature. Recording is continuous and various standard chart ranges are available. Two types of recorders are offered: an electronic instrument and a liquid-filled system type.

Copper Welding Rods

SEVERAL gas and arc welding rods for both thin and heavy copper sections and for producing hard overlays at temperatures well

below the melting point of copper have been announced by *Eutectic Welding Alloys Corp.*, 40 Worth St., New York 13. Known as EutecRods for gas application, and EutecTrodes for arc welding, the series includes two special flux-coated rods identified as EutecRods 183 FC and 184 FC, as well as special EutecTrode 30 AC and 300 DC for arc welding both electrolytic and deoxidized copper. According to the manufacturer, the main problems overcome by the Eutectic principle of alloying at low base metal temperatures involved elimination of oxide formation, porosity, imperfect or low-strength joints, poor finish, and lengthy preparation procedures for welding.

Axial Face Mill

KNOWN as the Axial Face Kennamill, a mill designed primarily for production milling of cast iron and also suitable for light to medium cuts on solid or cored castings, has been introduced by *Kennametal Inc.*, Latrobe, Pa. This new mill is said to incorporate the advantages of solid blade face mills with maximum number of blades. The manufacturer states that blades can be assembled to within a few thousandths on the face of periphery. Sharpening is simplified due to the open construction of the cutter, freedom from brazing strains, and because there are only three surfaces to grind. The tool can be mounted on all common spindles with bolt circle provided to order. The body is shaped to permit grinding a 45° corner angle for milling light-cored sections. Five sizes are available: 6, 8, 10, 12 and 14 in.

Finned Tubes

BELL end finned tubes suitable for use in generator air coolers, aftercoolers, economizers or other heat exchangers are available in suitable sizes from *Fintube Coil Corp.*, 635 E. Garvey Blvd., Monterey Park, Calif. Bell end facilitates retubing through large hole in tube sheet, it is reported, and serrated fins insure maximum heat transfer. The product is available in admiralty tubing with copper fins solder bonded to tubing. All-steel tubes can be supplied for high temperatures.

Steel Hinge

STEEL hinges which incorporate a spring clip to provide snap action to the lids of plastic packages has been developed by *General Electric Plastics Div.*, Pittsfield, Mass. Designed with teeth that bite into slots molded in both the cover and base of the package, the device simplifies assembling operations and eliminates use of screws and rivets. The hinge can be used in both thermosetting and thermoplastic materials. All spring tension is concentrated on the metal itself rather than the box cover and base. The hinge can be used without a spring for boxes not requiring snap action.

Utility Steam Cleaner

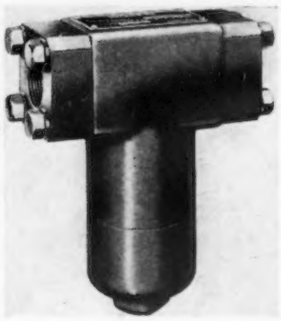
A UTILITY model steam cleaner has been announced by the Hypressure Jenny Div., *Homestead Valve Mfg. Co.*, Coraopolis, Pa. It is said to be a full-powered, extra heavy duty, all-purpose steam cleaner, featuring instant starting, simplicity of design and operation, rugged welded unit construction, and pressure atomizing oil burner. A choice of either oil or natural gas burner, and electric motor driven or gasoline engine driven mechanism, make the unit adaptable to most operation requirements.

Flexible Extension Shaft

TO improve usefulness of the company's power driven screwdriver, a flexible extension shaft designed to bring the machine to the work has been developed by *Rumac Mfg. Co.*, 24 E. 21st St., New York 10. In tightening or loosening screws the operator is not required to hold the machine where portable equipment is used. This extension, known as the Flex-O-Tension Shaft, when used with the screwdriver can drive screws with the operator using one hand, it is reported. An automatic stop tightens screws to the tension required and tension can be adjusted with an adjustable clutch.

Oil Filter

ANNOUNCEMENT of a proportional type oil filter using a venturi design has been made by *Vickers Inc.*, 1420 Oakman Blvd., Detroit. The design features a cartridge which filters out particles down to 2 microns in size. Reversible filtering action meets the requirements of closed circuits. The use of a by-pass valve is not necessary as the venturi action controls maximum pressure built up across the cartridge. The filter is universally adaptable being easily installed, it is said, in any horizontal hydraulic system pressure line. Maintenance requirements are limited to replacement of the cartridge.



Electrical Fastener

A SPEED NUT developed for use on electrical terminal boards to facilitate the interconnecting of capacitors and resistors, has been introduced by *Tinnerman Products, Inc.*, 2040 Fulton Road, Cleveland 13. In assembly with this Speed Nut, the U shape of the nut slips over the terminal board and holds itself over the clearance hole. A screw is then partially run down through the Speed Nut and board to anchor wires in place, one at a time, under the partially tightened nut until all are attached. The screw is then tightened to complete the connection.

... the trend is toward

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Assembly Line . . .

WALTER G. PATTON

• Parts for new model Chevrolet truck now in full production at Indianapolis plant . . . Change-over was made with a minimum plant shutdown.

INDIANAPOLIS — An excellent preview of things to come in the motor industry is afforded by the experience of Chevrolet-Indianapolis plant which has recently completed the first simultaneous change of all its truck models in Chevrolet's history.

The "growing pains" being experienced at Chevrolet's Indianapolis plant are typical of what may be expected by automobile manufacturers when new models are first put into production on a large scale.

Although the Chevrolet truck changeover has been made simultaneously with a huge plant expansion program, steady production—at a reduced rate, of course—was maintained except for a 2 week period. A further complication of the model changeover was the necessity for tearing down the existing office building, finding temporary office space for the clerical department and then moving the staff into the new office quarters provided under the plant expansion program.

This week GM's top echelon came to Indianapolis for an official inspection of the new layout, now the largest commercial body plant in the world and in many respects one of Chevrolet's largest and most complex operating units.

To discharge its responsibility for supplying parts to Chevrolet's 11 assembly plants in U. S., its export units, its Canadian operations and a variety of parts for GM trucks, the Chevrolet-Indianapolis plant has had to set up primarily for job press work. At the present time, parts and sub-assemblies are being supplied for 50 different Chevrolet commercial models of standard design. However, when the special requirements of many fleet truck buyers are included, the tooling setup at Indianapolis has had to prove itself equal to the job of meeting the requirements for more than 1000 different models of Chevrolet trucks.

To appreciate the size of the Indianapolis plant one must first realize that the present operating rate of the Chevrolet-Indianapolis unit requires about 500 tons of steel per day. Lumber requirements for truck floors average eight carloads per day and even an item like seats requires 7500 yd of fabric. Each day 33 carloads of finished material is being shipped to the various Chevrolet divisions. In addition, eight truckloads of finished parts are being shipped to nearby assembly plants.

THE Indianapolis plant has been laid out so that all raw material is delivered at one side of the plant and moves directly across the floor through the various presses to sub-assembly units which eventually deliver the finished parts to freight cars for shipping. No vehicles are assembled in Indianapolis. Approximately 4200 workers are employed at present.

Presses ranging up to 1600 tons are required to form the parts. The turret top for Chevrolet's panel trucks, for example, requires one of the largest stampings produced for the entire motor industry. The bed of the press being used for this operation is 90 in. from front to back and 208 in. wide. Total weight of the die alone is 60 tons!

According to Chevrolet plant engineers, the all-metal cab for the new Chevrolet truck is one of the most difficult press operations ever attempted at Indianapolis. Although operations have now been carried on for several months it is still necessary to give almost constant attention to the dies that are used to form the part.

Die tryouts on Chevrolet's turret top die for trucks extended over a period of 4½ weeks, with two men working on each of three shifts, it is reported. Skilled workers were hard to find and the Indianapolis plant managers found it necessary to bring in die makers from Detroit and Buffalo to expedite changeover operations. A similar shortage of skilled workmen is being felt in Detroit.

As every plant manager knows, die design although a highly skilled art, is still not an exact science. The unexpected always happens—what appeared to be a comparatively simple part often turns out to be an unusually difficult forming operation. Particularly where deep drawing is required, it may be necessary to do extensive grinding, add additional "beads" to the die, allow for additional spring-back of the metal or make other changes and adjustments. Occasionally it may be necessary to change to a heavier gage steel to accomplish the draws that are required for modern, streamlined cars.

For the first time in its history, Chevrolet - Indianapolis is using aluminum-killed steel for some of its most severe drawing operations.

ANOTHER complicating factor in producing these latest models, according to Chevrolet officials, is the fact that steel coming of necessity from the broadest group of suppliers in the history of the plant may respond differently under severe forming operations. For example, a considerable amount of difficulty has been experienced, it is reported, when steel purchased as slabs from one supplier has been sent to another mill for rerolling.

Scrap losses are always high when new models go into production, according to experienced auto

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press shopmen. Almost without exception dies require additional work before normal plant scrap loss of approximately 3 pct can be reached. Also, when the new models are first put into production, steel sheets are generally ordered oversize. For example, in the case of one Chevrolet operation, 78 in. sheets were used originally for a part. After several months' experience with the new dies, however, the sheet width was successively reduced to 72 in., thereby effecting an important saving in the plant steel requirements.

As experienced press shop managers will testify the use of excessively large quantities of steel is a normal experience with new models. However, it is something that must be reckoned with in estimating the number of completed assemblies that can be produced from a given number of tons of steel.

Like other large steel users in the industry, Chevrolet-Indianapolis is installing an uncoiler and flying shears to make it possible to use coiled stock. It has also, with some reluctance, set up pickling tank and oiling facilities for treating hot rolled stock. In contrast to some other auto plants, roller leveler equipment is being used only where extensive stretcher strains are experienced.

Chevrolet managers indicate that some aging difficulties have been experienced where steel has been stored for extended periods of time. However, no press room difficulties have been attributed to the presence of residual elements in flat rolled steel products.

As in the case of many postwar cars, the total steel requirements of the new Chevrolet postwar truck models have been increased appreciably. The larger, roomier cab alone requires approximately 100 lb more steel than the previous models. At present the floor of the cab for the new model is made of Great Lakes NAX and high tensile steel is being specified for other parts as a temporary measure, it has been reported.

A MANPOWER problem that is likely to confront most auto producers has already been experienced by Chevrolet's Indianapolis division. Expert tool and diemakers are said to be critically short. Trained metal finishers are not to be had. Therefore, an extensive training program has had to be inaugurated to make up the deficiency in skilled help. In addition, some experienced metalworkers are said to have requested transfer to press operations, adding to the present manpower problem. Another labor classification in which a shortage has been reported is wood modelmakers.

As it emerges from its problem of wrestling simultaneously with a new plant, a new model, a labor shortage and the most difficult materials supply problem in its history, Chevrolet-Indianapolis can afford to look on with something resembling smug satisfaction as other car producers in the industry go into production on their new models. But Chevrolet officials add quickly, they won't be able to rest very long on their laurels. "We never expect to be even moderately free of operating problems," one plant official commented.

o o o

MOBILE WORKSHOP: *Farm tools can now be kept sharpened and repaired by use of the new Sherman Farmcrafter, a tractor-operated workshop on wheels. A flexible shaft, with a grinding wheel mounted at one end, and the other end attached to the power unit, makes it easy for the farmer to sharpen his tools without the costly delay of removing parts.*

o o o

Appearance of Nash Is Changed Little

Detroit

• • • **Changes in exterior** and interior design and 26 engineering improvements are included in the Nash for 1948 which was introduced last week in dealers showrooms throughout the country.

To avoid interruption in production schedules, Nash officials kept styling changes requiring new tools and dies to a minimum, it is reported. Except for removal of the body molding, the new Nash is very similar in outward appearance to the previous model.

Mechanical changes include advanced cushion mounting of engines, better cooling and lubrication and new larger low-pressure Goodyear super-cushion tires.

The new cars include three different body types in the medium-priced Nash Ambassador series and four types in the lower-priced Nash "600" series.

Factory delivered price of the new cars range from $1399 for the "600" series deluxe business coupe to $1821 for the Ambassador series.

Pittsburgh Steel Net Soars

Pittsburgh

• • • **Pittsburgh Steel Co.** reported third quarter 1947 earnings of $947,475 and earnings for the first 9 months of this year of $2,834,362. Net income in the third quarter of 1946 was $607,353. For the 9 months ended Sept. 30, 1946, which included strike losses, the company reported a net loss of $931,223.

West Coast . . .

ROBERT T. REINHARDT

• Experienced steel men plan small bar mill in southern California . . . Utah CIO counsel resigns, charging "fumbling" in combatting Communism . . . Power shortage affects Oregon steel mill.

LOS ANGELES—Southern California is to have another independent steel producer if the well-laid plans of two experienced steel men develop.

Lewis B. Kean—who for many years was affiliated with the U. S. Steel Corp. in Chicago, Denver and San Francisco, and most recently sales manager for Judson Steel Corp. at Emeryville, Calif.—has joined forces with Mason E. Miles, formerly with Allegheny-Ludlum as Pacific Coast office manager, to organize the Century Steel Corp.

Present plans call for the construction of a mill with an approximate capacity of 3000 tons of merchant bars monthly and an electric furnace to operate largely on scrap. The site of the mill has not as yet been purchased but Mr. Kean told THE IRON AGE that it is anticipated 10 acres will be bought in the Los Angeles industrial area.

Application has been made to the Security Exchange Commission for authority to sell 4000 shares of Class B common stock at $100 par value which, it is announced, are to be offered to the public at par.

Lewis B. Kean, Sr., is president of the new organization, his son, Lewis B. Kean, Jr., vice-president-secretary and Mr. Miles is treasurer of the new organization. This group will retain the 1000 Class A shares not registered with the SEC.

According to Mr. Kean, Sr., it is hoped that this plant will be in production by the middle of 1948.

This will be the first independent mill of its kind in the south and compares in size to the Northwest Steel Rolling Mill, Inc. of Seattle, which has an annual rolling capacity of approximately 25,000 tons.

There have been rumors of several new steel production facilities in this area during the past 2 years but this is the first project for which a financing program has announced.

Ford Motor Co. spokesmen are greatly encouraged by the enthusiasm with which southern California manufacturers have come forward to build parts in Ford's $65 million purchasing program. Prior to Ford's program it was considered that southern California's manufacturers could never compete pricewise with eastern manufacturers in the automobile parts market. However, there are indications that with the freight latitude, southern California manufacturers not only can compete but in several instances have been lower than eastern manufacturers.

Ford anticipates providing its West Coast market with Fords made almost completely in California and with Mercurys made in great part in the state with the exception of motors. Assuming that materials will be available, this program should be in operation within 2 years, according to Lou C. Disser, head of the Ford West Coast purchasing program.

Since the inception of this parts buying program, Ford has contracted with 125 California manufacturers. The contracts call for purchase of locally produced small screws, screw machine parts, forgings, rubber components, wire assemblies, coil springs, interior trim sets and other parts. California factories are already producing all the passenger car wheels used in West Coast Ford plants.

California manufactures hope to complete contractural agreements in similar parts buying programs with General Motors, Nash, Willys-Overland, Studebaker, and Chrysler in the near future.

SAN DIEGO—An experimental flying automobile developed by Consolidated Vultee Aircraft Corp. made its initial taxi tests here.

The four-place flying automobile is a further development of an experimental model which Convair started testing about a year ago. Designed by T. P. Hall, the new plane has a detachable wing.

The all-metal wing has a span of 34½ ft. One large seamless aluminum-alloy tube is used for the wing spar, one for the tail boom, and smaller tubes for the empennage spars. The spars and ribs are covered with metal skin. A 190 hp Lycoming engine is installed on the flight section.

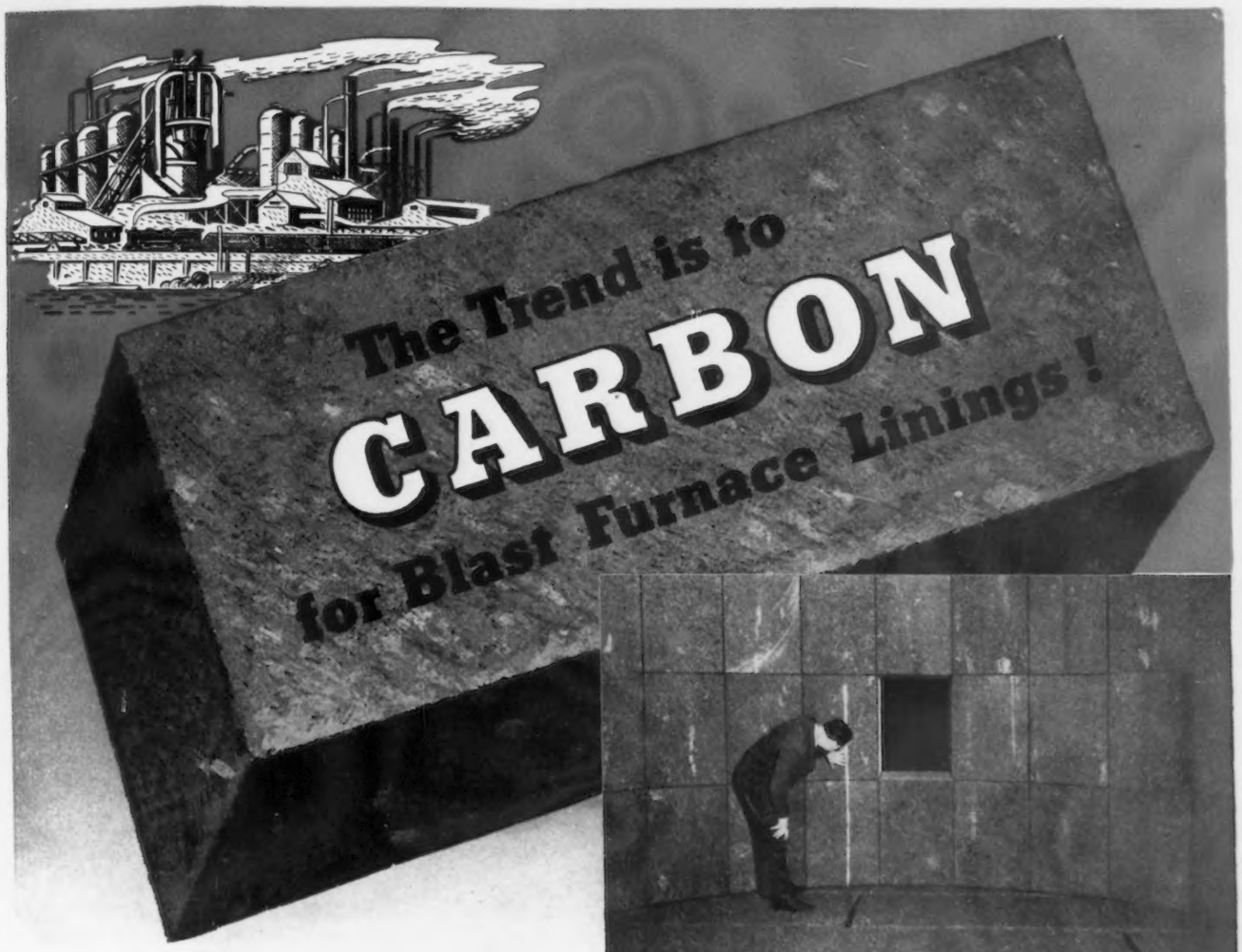
The car has four wheels equipped with hydraulic brakes. Shock absorbers are included to provide easy riding qualities and to absorb landing loads.

The flight section is secured to the automobile at three attachment points located in the top of the car. A steel tube structure in the car will support over six times the weight of the flight section.

The project is one of a series of experimental personal-type planes which Convair has studied during the past few years. These included the Spratt controllable wing, and four-place and two-place pusher planes.

Extensive ground and flight tests, which will take several years, must be made before the company can determine whether this latest experimental plane is practical, William A. Blees, vice-president of sales said.

SALT LAKE CITY—The ideological fire in the CIO-International Union of Mine, Mill and Smelter Workers was refueled last week by the resignation of Willard Y. Morris as legal counsel for the district union and the Utah CIO. Mr. Morris, who has long been



Interior of hearth lining looking toward iron notch. Blocks may be of any size desired up to 24x30x180 in.

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obnoxious to the communist and fellow traveler elements in the mine and smelter union, bluntly announced that his action was prompted by the pressuers, financial and otherwise, which the communist forces have been applying to the district organization in an effort to force him out.

George Wilde, district president, and a majority of the executive board reaffirmed their position in the fight by rejecting the resignation for the record. But Mr. Morris resigned anyway, issuing a public statement in which he inferentially warned the anti-communists that they would have to fight tougher or lose the battle.

"Indecision, delay and fumbling," he said, "have characterized the efforts of those who sought to keep their ranks clean.

"As a result we find today that many of the more important locals have become pawns of the international union and communists and serious inroads have been made in several others."

He asserted that the anti-communists cannot hope to win control with passive measures inasmuch as they are fighting "an efficient, formidable foe which is not hindered by traditional ethics and standards which most of us follow."

About 3000 tons of plate produced at the Geneva Steel Co. plant has been shipped to Milwaukee, Wis., for fabrication into pipe and shipped back to Utah County for a line to supply the Provo area with natural gas. The arrangement will permit the Mountain Fuel Supply Co. to complete the line early in 1948, whereas without the cooperation of the local steel plant it could not have been built until sometime in 1951, it is reported. That was the earliest date pipe manufactureres would guarantee delivery of materials.

Utah's first important satellite plant dividend arising from U. S. Steel Corp.'s acquisition and operation of the Geneva plant was announced last week by the Chicago Bridge & Iron Co.

THE fabricating firm has acquired a 43 acre site in the southwest part of Salt Lake City and plans to start construction at once of a plant to serve its western and Pacific export trade. No details regarding the size of the plant or the number of men it will employ were disclosed. Grapevine reports indicate a setup that will employ between 500 and 1000 men and utilize a substantial part of Geneva's plate output. Chicago Bridge & Iron Co., which specializes in fabrication and installation of tanks for the oil industry and water supply works, has an established business in the West which can be economically served from the Utah plant.

Officials of the company have been studying the feasibility of a plant in this area for more than a year but the project has had to move slowly because of the general shortage of steel. A major factor in the company's decision to locate here was said to be its long and satisfactory relationship with U. S. Steel as a supplier of steel for its fabricating operations.

The shortage of railroad cars for the coal haul has reduced the Salt Lake area coal supply to about one-half of normal, according to B. P. Manley, executive secretary of the Utah Coal Producers' Assn. Mr. Manley said the situation was not serious and that stocks would probably start building up when cars now being used in the sugar beet harvest are released.

War Assets Administration has suspended negotiations with J. R. Simplot Co. of Caldwell, Idaho for the Kalunite plant in Salt Lake City and ordered the property readvertised for bids because of the intervention of senators from Washington and Oregon. The legislative representatives notified WAA that Columbia Metals Co. was interested in bidding on the Utah plant. Columbia operated a war alumina plant at Salem, Ore. and is now using the facility for production of ammonium sulphate. J. O. Gallagher, president, indicated to WAA officials that he planned to use both the Oregon and Utah plants for production of a blended fertilizer.

Simplot had bid up to $510,000 for the plant and was negotiating on price when Columbia entered the picture. Acquisition cost was about $4,500,000 and WAA had fixed a sales valuation on the plant of $611,000.

TENITE FOR STEEL: *Easy to join extruded tenite tubing is replacing steel gas pipe in home installations made by Southern California Gas Co. Only a solvent cement and a sleeve of larger diameter tenite tubing are needed to join the pipe.*

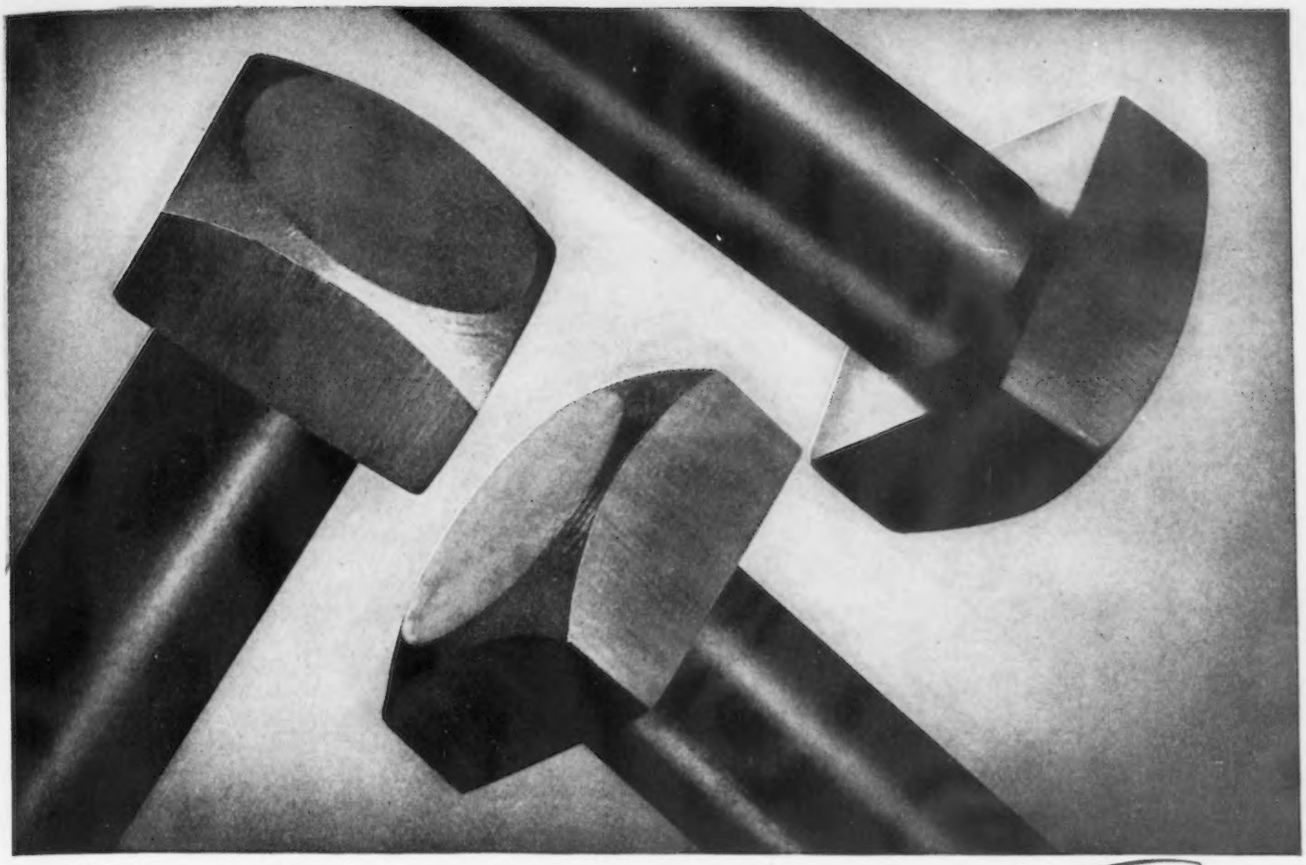
PORTLAND—Production of steel at Oregon Steel Mills is being handicapped by a shortage of electric power for the operation of their furnaces and a shortage of scrap, according to John Mears, general manager.

The two, 25-ton furnaces are unable to operate 24 hr per day, and at present are being shut down at 4 o'clock in the afternoon until 10 o'clock at night when power again becomes available. Although with this restricted furnace operation scrap scarcity has not caused a shutdown, supply has been barely equal to the 5000 to 6000 ton a month demand.

This producer is one member of a firm of which the other two partners are the General Construction Co. and the Zidell Machinery & Supply Co. organized for ship breaking and salvage sale. General Construction handles the actual breaking operations and Zidell disposes of the salvage material over and above the scrap steel consumed by the Oregon furnaces. This group has already wrecked three aircraft carriers and has purchased four additional carriers, two PC boats, three net tenders and three frigates for breaking.

Consolidated Builders is the company recently organized for ship breaking at Swan Island and is just getting underway with actual breaking operations, although they have 16 LSTS available. Approximately 250 persons will be employed in this yard. Ship repairs will be continued by the same organization.

Swan Island is rapidly losing its wartime atmosphere as large sections are being transferred to industrial companies. It is reported by WAA that 33 buildings of the ship yards in addition to those which are being held for federal agencies, have already been leased and still others are open for bid.



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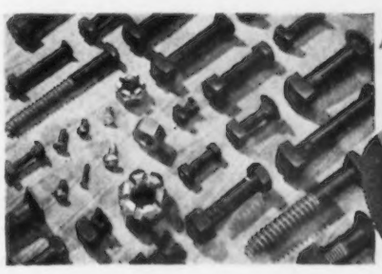

Washington . . . EUGENE J. HARDY

• Harriman group recommends legislation requiring stockpile materials for European aid . . . Raising output capacity of 16 nations would make available $250 million worth annually.

WASHINGTON — Substantial quantities of certain critical raw materials needed by the United States for its stockpiling program are available in foreign countries and should be sent us in exchange for goods and materials shipped to Europe under the European Recovery Program; furthermore, a provision making this conditional should be included in any legislation authorizing such foreign assistance.

This proposal is one of the basic recommendations contained in last week's Harriman Committee report to the White House concerning America's ability to supply European reconstruction requirements as estimated and requested in the Paris report.

The progress made in acquiring a reserve of strategic and critical raw materials since the enactment of the Stockpiling Act in 1946 is deplored in the Harriman report. It goes on to say that to date "the purchase program has been very unbalanced and acquisition of major strategic raw materials has been negligible."

Five years were allotted in which to carry out the $2 billion stockpiling program (THE IRON AGE, Jan. 2, 1947, p 117). Approximately $275 million of the estimated total cost has been appropriated by Congress for new procurement for the first two years of the program; it is pointed out in the report that by the end of next June only about 20 pct of the over-all program will have been met—leaving 80 pct to be carried out during the final three years. The Committee of 19 which prepared the Harriman report sees fulfillment as impossible unless more foreign tonnage is made available to the United States.

"Legislation extending aid for European recovery should include specific provisions for procuring strategic raw materials for the stockpiling program from the participating countries or their colonies," the report recommends specifically.

HOWEVER, the committee makes it plain that it would not have this country deprive others of any current production. Its studies have indicated that in most instances the current output of these materials is below potential capacity; it estimates that by helping increase foreign production and requiring that the excess above present production levels be allocated to the United States in return for reconstruction aid, some $250 million worth of strategic materials could be added annually to our stockpile during the term of the aid program. Current expenditures with these countries for stockpiling purposes amount to approximately $17 million.

For example, the Munitions Board is currently purchasing, or would like to buy, cobalt for the stockpile at the rate of four million pounds annually. The committee estimates that production could be stepped up by a million pounds annually in both the Belgian Congo and in British Rhodesia; under the committee recommendation this would make available for the United States stockpile about half its present purchase rate.

On the basis of available information, eight of the 16 participating countries (or their colonies) produce one or more of 16 materials included in the Stockpiling A List. Three of these nations are now supplying a major portion of the $17 million worth of current purchases from European sources —The Netherlands, $7.3 million; Belgium, $6.1 million; and, the United Kingdom, $3.1 million.

THE report offers the belief that British output could be increased so as to provide $119.8 million worth of strategic materials; The Netherlands, $48.6 million; Belgium, $63.7 million; France, $11.9 million; and all others, $10.1 million, to bring the total to $253.7 million annually.

The materials to be furnished by these 16 nations would include (at present market prices): tin, $119 million; copper, $32 million; lead, $24 million; bauxite, $23 million; industrial diamonds, $22 million; zinc and manganese, $8 million each; chromite, $6 million; tungsten, $5 million; cobalt, $3 million; and lesser amounts of asbestos, columbite, corundum, graphite, mica, nickel and tantalite.

Cobalt production capacity in the Belgian Congo was greatly expanded during the war and a considerable portion of the current five million pound output is being sold to the United States. Rhodesian capacity was also enlarged during wartime and reserves of both of these chief cobalt sources are reported as adequate to permit stepping up production by at least a million pounds each. French Morocco is producing substantial quantities of cobalt but expansion is not generally considered feasible because of technical problems involved.

Present production of copper mines in the countries involved in the Marshall Plan is running at little more than two-thirds of capacity when measured by wartime peaks. Estimated 1947 output for Britain, Norway, Sweden and Belgium aggregates about 430,000 metric

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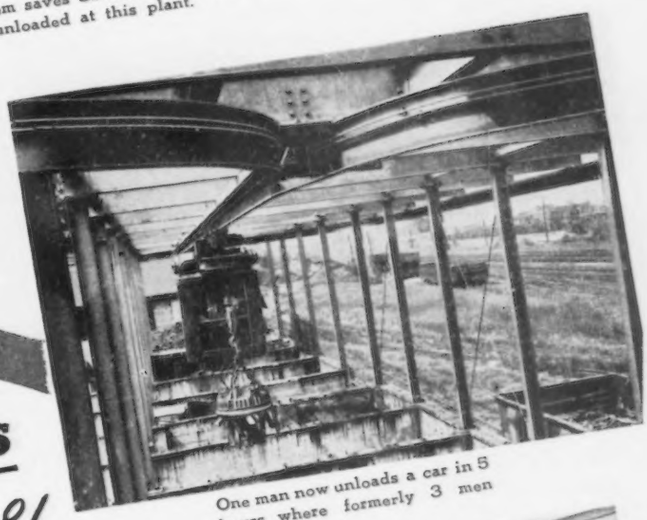

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The savings in time is just part of the story since the system is used for breaking scrap as well as storing copes.

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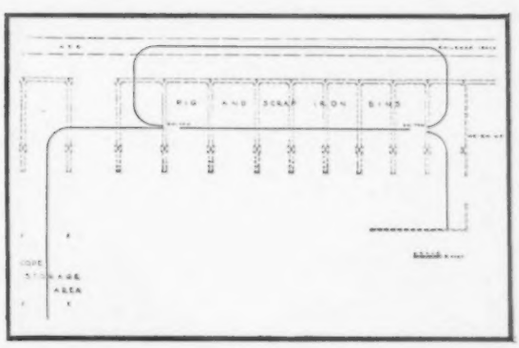

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tons. It is felt that there would be little difficulty in increasing production by at least 80,000 tons.

LEAD mining in Greece, suspended during the war, has not yet been resumed and does not enter into the Committee calculations since it is felt that potential Greek production over the next five years would probably fall short of meeting its own domestic requirements. This leaves two probable sources for additional supplies of this metal —Burma and French Africa.

The major source would be in French Tunisia and Morocco where lead production is currently at about prewar levels of 40,000 tons. American mining interests have already begun development of lead properties there and it is expected that by late 1949 an additional 25,000 tons will be coming on the market.

In Burma, the reopening of the British-owned Burma Corp. war-damaged properties will add another 75,000 tons to current production. Even with financial aid, however, it is estimated that two to three years will be required for reaching prewar output, largely because of the scarcity of labor. Reopening of the Burma mines will also make available an additional 50,000 tons of zinc; while zinc is not considered in short supply, it is on the stockpiling list as a strategic material.

Tin production in the Far East ceased for all intents and purposes with the Japanese occupation. Rehabilitation and replacement of equipment is not seen possible of completion before the end of next year and, as a result, it is not expected that prewar levels of production can be reached until late 1949. Together with a slight improvement in supply from the Belgian Congo, a minimum of 50,000 long tons of tin might reasonably be expected to become available for stockpiling in about two years.

THERE is no shortage of bauxite and its output from the Guianas and Dutch Indies appears to be limited only by plant facilities plus markets. Transportation is held by the Committee report to be the only serious bottleneck to acquisition of chromite from Southern Rhodesia; solution of the problem would make available at least 100,000 tons from this source. Improvement of technical processes and equipment would add to the annual capacity of Turkey and New Caledonia by 50,000 tons.

The remaining materials on the list of sixteen are held as of relatively little import in the recommendations and report. Estimates of possible increased production are conservative and only a small increase over present production is seen. Industrial diamonds, of course, remain under rigid control of the diamond cartel.

Tariffs Announced

Washington

• • • The general agreement on tariffs and trade concluded at Geneva on October 30, released this week by the State Dept., reveals important tariff concessions made by the United States on various metal products as well as concessions made by the 22 other negotiating countries of not so extensive a nature.

This general agreement which becomes effective Jan. 1, 1948, or as soon thereafter as practicable, replaces existing reciprocal agreements to which the U. S. was a party. The agreement must become effective by June 30, 1948. Under it, each participating nation enjoys all of the concessions in the schedules of the other negotiating countries. Illustrative of the concessions made by the U. S. are 50 pct tariff reductions on bauxite, copper, manganese, and metal working machinery. Other items on which the U. S. made concessions of less than the 50 pct maximum permitted by law include zinc, aluminum, tungsten, pig iron, certain steel products and electrical machinery. Concessions were obtained by the U. S. on such things as automobiles and parts, aircraft and parts, industrial machinery, electrical machinery, agricultural machinery, and certain metals and metal products. Under the agreement many British preferences were reduced and others eliminated. Britain is also prohibited from creating new preferences or increasing those already in existence.

The agreement also incorporates basic rules with regard to non-discrimination, internal charges and restrictions, quotas and exchange controls, and other measures which cover the whole of the trade between the 23 negotiating countries and which are not limited to the scheduled items.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

PERSONALS

° ° °

• **Walter G. Tucker** has been elected chairman of the board of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio. Dr. Tucker returns to responsibilities which he carried from 1933 to 1945, following 17 years as president of the company. **Paul C. Pocock,** formerly vice-president in charge of sales, assumes active direction of the company's operations as executive vice-president and general manager. **Warren R. Tucker,** who has been vice-president of Commonwealth Engineering Co., Dayton, has been elected to fill the newly-created post of vice-president in charge of engineering and research.

• **Howard J. Davis** has been appointed manager of sales for wire products, Colorado Fuel & Iron Corp., Denver. Mr. Davis came to CF&I in 1940 to establish a welded wire fabric division. Three years later he was appointed assistant manager of wire product sales. In June of this year he was made manager of product research and development for the western division. He is replacing **John T. Brittain,** who has been appointed manager of sales of the California Wire Cloth Corp., Oakland, Calif., a CF&I subsidiary. Mr. Brittain has been with CF&I since 1937.

• **Albert W. Searratt,** vice-president in charge of engineering and patents for International Harvester Co., Chicago, has retired after 20 years with the company. Mr. Searratt was elected vice-president in 1939. **A. E. W. Johnson,** formerly manager of engineering for the company's farm implement division, has been appointed director of engineering for the company and will assume the duties formerly under the supervision of Mr. Searratt. Mr. Johnson has been with the company 31 years in engineering and development work.

• **William D. MacDonnell,** assistant to the general manager of the Lackawanna, N. Y., plant of the Bethlehem Steel Co., has been promoted to assistant superintendent of the steel division there, and **Milton E. Moshier,** assistant superintendent of the No. 3 openhearth division, has been named assistant to the general manager.

• **Jack H. Gill** has been appointed engine sales consultant for Caterpillar Tractor Co., Peoria, Ill. In his new capacity Mr. Gill will advise, coordinate, and plan the development of engine sales with sales managers at the company's main offices. Mr. Gill formerly was an engine salesman with Wm. K. Holt Machinery Co., Caterpillar distributor in San Antonio, Tex., from 1933 to 1937, and joined Caterpillar Tractor Co. in 1937.

ROBERT C. GRAVES, vice-president in charge of sales, Federal Electric Products Co.

• **Robert C. Graves** has been appointed vice-president in charge of sales of Federal Electric Products Co. at Newark, N. J. He was connected with the Trumbull Electric Mfg. Co. since his discharge from the Navy at the close of World War I. In 1944, he became vice-president of the firm, in charge of sales.

• **C. S. Baker,** president and general manager of the Baker Mfg. Co., Evansville, Wis., has resigned.

• **Reober M. Maull,** long associated with the Tabor Mfg. Co.'s sales policies, Philadelphia, will now exclusively devote all his time to his position of treasurer and comptroller, which functions have been greatly expanded.

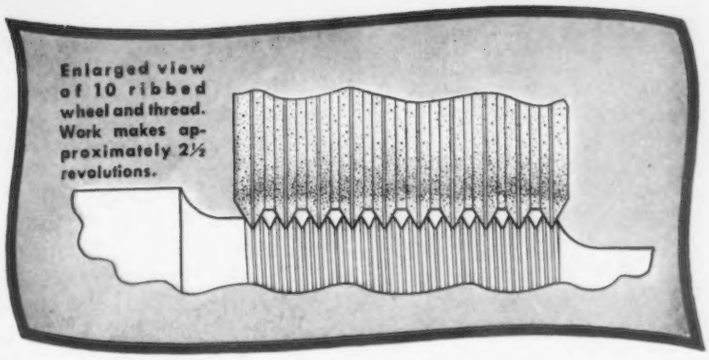
• **S. A. Crabtree** has been appointed district sales manager in charge of the Chicago sales office, Republic Steel Corp., replacing **W. J. Hanna,** who has resigned. Mr. Crabtree's career began with the Berger Mfg. Co., now a division of Republic Steel. He was later transferred to the sales department of United Alloy Steel Co. In 1926 he joined Central Alloy Steel Co., where he remained until 1933, when he was transferred to the Chicago sales district and 5 years later was named assistant district sales manager. During the war he was in Washington serving as assistant director of the steel division of the War Production Board.

• **William E. Bryden,** sales engineer, Timken Roller Bearing Co., has been transferred from the Chicago office to the Cincinnati office of the Timken Steel & Tube Div. He will be succeeded at Chicago by **William T. Strickland,** sales engineer, who joined the Timken company in 1946.

• **R. B. Moir** has been advanced to assistant vice-president in charge of engineering and product development of the industrial gear division, Foote Bros. Gear & Machine Corp., Chicago. **B. H. Quackenbush,** formerly assistant sales manager, now assumes the full responsibility of sales manager of this division.

• **Francis J. Trecker** has been elected president of the Kearney & Trecker Corp., Milwaukee, to succeed his late brother, Joseph L. Trecker, and **Edgar W. Trecker** has been made vice-president. Both were elected to the board of directors. **Raymond L. Bischoff,** former treasurer, has been given the additional responsibility of being secretary of the firm. The new president was associated with Pratt & Whitney Corp. for several years and later was with a New York engineering firm. He joined Kearney & Trecker in 1939 as a sales engineer.

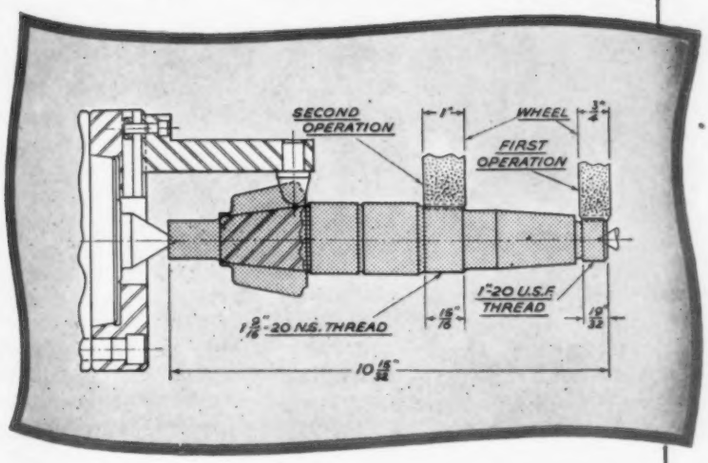
• **Thomas D. Hess** has been appointed assistant openhearth superintendent of Crucible Steel Co. of America, New York. Mr. Hess was in the openhearth department of Bethlehem Steel Co.'s Steelton, Pa., plant for about 10 years.



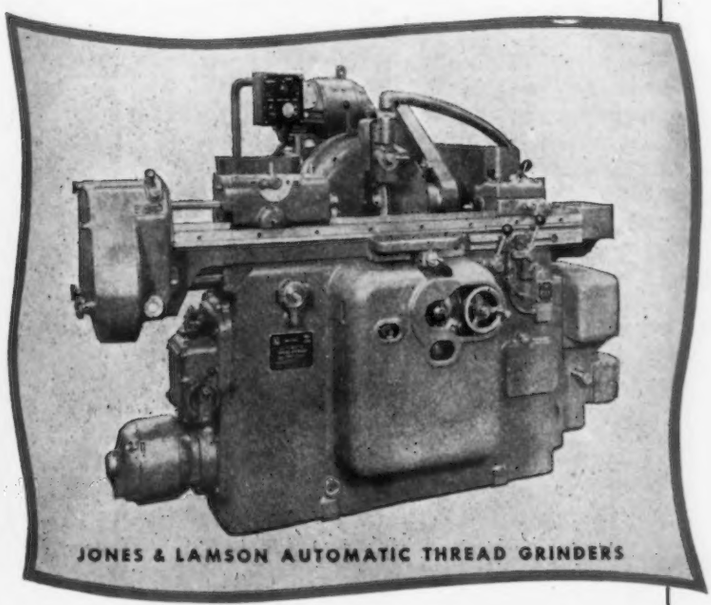
HERE'S *Production* THREAD GRINDING . . .

Ground from the Solid in *15 seconds*

1"—20 N.S. THREAD, GROUND FROM THE SOLID



ON AXLE DRIVE PINIONS



"PRODUCES NEAR PERFECT THREAD"

"EXPENSIVE HAND DIE OPERATIONS ELIMINATED"

"NO MARRED THREADS ON THE ASSEMBLY LINE"

"WHEEL COST PER PIECE LESS THAN THREAD HOB AND CHASER COST"

The Timken Detroit Axle Company, prominent manufacturer of heavy truck axles, has this to say about a Jones & Lamson Automatic Multi-Ribbed Thread Grinder installed to grind the threads on axle drive pinions.

"The threads are machined as a last operation following heat treat and grinding of all bearing diameters and prior to lapping. The machine produces a near perfect thread and eliminates all expensive hand die operations along the line and overcomes marred thread on the assembly line".

". . . the grinding of threads also reduces direct labor costs and indirect cost of cutting tools and equipment".

Jones & Lamson Automatic Multi-Ribbed Thread Grinders offer remarkable opportunities for economy with better quality in the mass production of threaded parts. Ask for one of our engineers to tell you more about multi-ribbed production thread grinding.

JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U. S. A.

Manufacturer of *Automatic Thread Grinders* and Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies

W. C. NEWBERG, president, Airtemp Div., Chrysler Corp.

• **W. C. Newberg** has been made president of the Airtemp Div. of Chrysler Corp., Detroit, succeeding **D. W. Russell,** who is retiring to enter private business. Mr. Newberg in 1942 was named chief engineer of the Dodge-Chicago plant. From 1945 to the present time, he has been on the staff of C. L. Jacobson, assistant to the vice-president and general manager of Chrysler Corp. in charge of the corporation's subsidiary activities.

• **Dr. H. E. McGuire,** who has been chief surgeon since 1912 for Jones & Laughlin Steel Corp., Pittsburgh, has retired. He has been succeeded by **Dr. Scott A. Norris,** who has been assisting Dr. McGuire for many years. **J. G. Littell,** real estate agent, has also retired. He started to work for J&L in 1921. He has been succeeded by **D. S. Donkin,** who was formerly assistant real estate agent. Mr. Donkin's new title is manager of real estate and insurance.

• **Dr. Thomas P. May** has joined the corrosion engineering section of the development and research division of the International Nickel Co., Inc., at New York. Formerly, since 1940, Dr. May was with the chemistry division of the U. S. Naval Research Laboratory in Washington, D. C., where he served as head of the corrosion section.

• **D. F. Axelson,** vice-president in charge of manufacturing, Axelson Mfg. Co., Los Angeles, has retired and resigned after some 40 years' association with the company. **R. M. Pease,** formerly vice-president and manager of the company's plant in St. Louis, has been promoted to vice-president and assistant general manager with his headquarters at the main plant in Los Angeles. **Victor Mancuso,** formerly works manager, has been advanced to the position of vice-president in charge of manufacturing.

• **Paul L. Arnold** has been appointed resident manager of the Chattanooga, Tenn., works of the U. S. Pipe & Foundry Co. Mr. Arnold's service with the company commenced in 1930 when he joined the research department at the general offices in Burlington, N. J. He served in that department until 1945 when he joined the operating department of the company and was superintendent of the company's Shell Div. at Addyston, Ohio, until August of 1945 when he was assigned to the Chattanooga works. He was appointed assistant resident manager in 1946 and succeeds **A. J. Fruchtl** in the top capacity at this plant.

• **Ernest R. Schmidt** has been appointed plant manager of the Budd Co.'s Hunting Park plant, Philadelphia. Mr. Schmidt joined the Budd organization in 1917.

• **Harry A. Wright** has been appointed engineer in charge of control sales of the control section of the Allis-Chalmers Mfg. Co., Milwaukee, electrical department. Mr. Wright has been associated with Allis-Chalmers since 1937 and prior to assuming his present post was staff engineer of the company's control engineering section.

• **Paul H. Merriman** has become associated with D. M. Steward Mfg. Co., Chattanooga, Tenn., in the capacity of electronics development engineer. Mr. Merriman has been connected with the electrical and electronics fields for the past 15 years, and until recently was head of the electrical section of the engineering laboratories of the Glenn L. Martin Co.

• **J. F. McQuillan** has been appointed superintendent of the Whiting, Ind., plant of Federated Metals Div., American Smelting & Refining Co. **A. S. Wigle,** former plant superintendent at Whiting, has been promoted to general superintendent of all Whiting operations, which includes the company's plant in nearby Chicago. Immediately prior to his new appointment Mr. McQuillan was superintendent of the company's Perth Amboy, N. J., plant, where he had been located since 1945.

• **David N. Burruss, Jr.,** has been appointed director of engineering for the Glidden Co., Cleveland. Mr. Burruss was formerly general manager of Glidden's Metals Refining Co. division, Hammond, Ind. **E. P. Palmer,** formerly superintendent of the Metals Refining Co., has been named acting manager of that division. Mr. Burruss joined Glidden in 1923 as a foreman in the chemical and pigment division of the company. He was named, successively, production manager, superintendent and manager of that division's plant at Collinsville, Ill. He later became vice-president of Glidden's Naval Stores Div. and was appointed general manager of the Metals Refining Co. in 1935. Mr. Palmer began his career with the Chase Brass Co. and later became deputy chief of the copper division, War Production Board. He joined the Glidden Co. in 1944.

DAVID N. BURRUSS, JR., director of engineering, Glidden Co.

• **Alexander Martin** has been made manager of the central district of the Sturtevant Div. of Westinghouse Electric Corp., with offices in Pittsburgh. He replaces **Harold C. Hickock,** who has resigned. Mr. Martin has been with Sturtevant since 1925 as chief draftsman, later manager of the Newark office, and since 1942 as manager of the industrial sales department at division headquarters in Hyde Park, Mass.

• **R. W. Brunsman** has been named sales manager of the professional sales division and **R. G. Halvorsen,** sales manager of the contract and distributor department of Hamilton Mfg. Co., Two Rivers, Wis. **W. A. Friedrich,** former director of sales of the home appliance division, has resigned to form his own business.

• **H. L. Gebhard** has joined the Fairbanks-Morse & Co. organization as a sales engineer with headquarters in the Chicago office. He was formerly general diesel locomotive foreman at the Burnside plant of the Illinois Central R.R. **C. B. O'Neil,** for many years manager of the railroad department at St. Louis, has also taken over the duties formerly handled by Frank Ross.

• **Lee T. Craig,** until recently assistant general sales manager, has been appointed general sales manager of the Steel Co. of Canada, Ltd., with headquarters in Hamilton.

• **Charles H. Stamm** has been elected to the board of directors of International Detrola Corp., Detroit. He is a vice-president and is general manager of Detrola's Newport Rolling Mill Div.

MILTON C. SARRAN, manager of sales, warehouse division, Atlantic Steel Co.

• **Milton C. Sarran** has been appointed manager of sales for the warehouse division, Atlantic Steel Co., Atlanta. Mr. Sarran has been with Atlantic Steel for 14 years as district sales manager in large industrial territories.

• **James E. Nichols** has been appointed chief stationary engineer, Youngstown Sheet & Tube Co., Youngstown, succeeding **F. B. Rathburn,** who retired recently. Mr. Nichols came from the General Electric plant in Pittsburgh 18 years ago to be assistant chief stationary engineer for Sheet & Tube.

• **S. H. Egbert** has been appointed production manager of McCulloch Motors Corp., Los Angeles. He has been assistant production manager, directing procurement for the past year. Mr. Egbert joined McCulloch Motors after his release from the Marine Air Corps.

• **Herbert J. Kettler,** formerly in charge of service engineering in the Chicago area for Hagan Corp., Pittsburgh, has been transferred to St. Louis to assist J. C. McFarland, manager of the firm's St. Louis office. Mr. Kettler has been associated with Hagan Corp. and its member companies for some years. **Gerald G. Lipke** has been transferred from Denver to the Hagan-Hall-Calgon staff in Pittsburgh, and **Robert L. Hankison,** former member of the Pittsburgh engineering department, has been assigned to sales. Mr. Lipke has served as district engineer in Denver since his return from military service in 1946. He joined Hagan in 1936. Mr. Hankison has been associated with Hagan since 1934.

• **C. O. Miller,** who has been director of the purchasing and salvage section of the manufacturing staff of General Motors Corp., Detroit, has left that position to handle special assignments. **H. L. Dingler,** until recently director of the industrial engineering section, has succeeded Mr. Miller as head of purchasing and salvage. **Paul A. Switzer** has taken over Mr. Dingler's former duties as director of the industrial engineering section. Mr. Switzer had been assistant to Mr. Dingler.

• **Robert W. Ramage** has been appointed Buffalo district sales manager of Bliss & Laughlin, Inc. He entered the employ of the company in 1946. **Deppen Kline** has been appointed metallurgical engineer attached to the Buffalo plant. He returned to Bliss & Laughlin in 1945, following several years in the Navy.

...OBITUARY...

• **Edwin M. Allen,** 75, former chairman of the board and former president of the Mathieson Alkali Works, died on Nov. 2. He was a director of the company at the time of his death.

• **A. B. Addington,** 49, plant superintendent and personnel director for McWane Cast Iron Pipe Co., Birmingham, died Nov. 5. He had been associated with the company 23 years.

• **Benjamin F. Fithian,** 59, assistant secretary and traffic manager of the Russell Mfg. Co., Middletown, Conn., for the past 13 years, died Nov. 6.

• **J. S. Gravely,** who retired recently as president and chairman of the board of the Beryllium Corp., Reading, Pa., died Nov. 10.

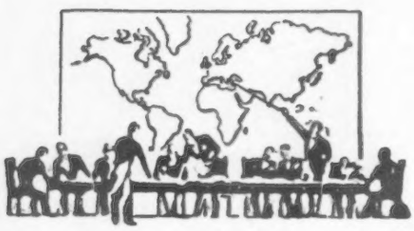
• **Walter S. Quinlan,** chairman of the board, Robbins & Myers, Inc., Springfield, Ohio, died Oct. 18.

• **Conrad Weitenstein,** 69, president of the Weitenstein Iron Works, Buffalo, until his retirement 2 years ago, died Nov. 2.

• **Howard E. Long,** supervisor of technical data for the Harrison Radiator Div. of the General Motors Corp. at Lockport, N. Y., since 1934, died Nov. 8.

European Letter . . .

• If new start in France with General de Gaulle coming into power is inevitable, the sooner it comes the better . . . Too long a delay might cause bloodshed.



LONDON—If General de Gaulle were to come to power in France, there can be little doubt that the first reaction among most people in Great Britain would be one of alarm and anxiety. Strong regimes of the Right are rightly suspect among democrats. Yet there is, with each week that passes, less and less room for doubt that the General's accession to power by constitutional means (the qualification is important) is the solution of the French crisis that ought to be the most welcome—or the least unwelcome—to France's neighbors.

It is time this was said, for there has been too much humming and hawing about the General, and about his foibles and his followers. Much has been argued and asserted about the beating that his party gave the Communists and the progressive Catholics in the municipal elections a fortnight ago; but the question of what is the best solution to the French moral and economic crisis has not been put, in this country, in the form that all foreign political questions should be put, at one stage or another: What is the British interest in the matter?

With the question in such a form the simple answers suggest themselves. It is a matter of eliminating the alternatives. Is it a British interest that France should be ruled by Messrs. Thorez and Duclos, with an internal policy of social revolution and a foreign policy of hostility to America? Clearly the answer is No.

Is it then a British interest that the government of France should be continued by coalition, with the present Socialists and men of the center, propped up between the militants of Right and Left and trying with inadequate powers to stop inflation, save the franc and prepare the way for participation in a Marshall Plan? All instinct answers Yes; the middle way is generally to be preferred, and the majority of men and women in France are showing their usual preference for it; some who voted for General de Gaulle recently got nervous since.

BUT in France today the continuance of the middle way means a continuance of the ineffective, spineless government that the Fourth Republic, like the Third, has hitherto exhibited. Another winter's nerveless wrestling with food shortages, selfish farmers, discontented workers and housewives, dishonest taxpayers and well-drilled trade unions might so sharpen the public mood that a constitutional solution might be impossible, and either Right or Left would be led to take measures of the kind which provoke civil war.

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If there must be a new start in France, the sooner it comes the better. To delay it too long might make bloodshed inevitable. In that case, if coalition government by discredited representatives of the prewar party system is likely to prove dangerous as well as futile, the third question presents itself.

Is it a British interest that France should have a government that would provide leadership, overcome disunity and concentrate the national energies on restoring health and strength to the French state? The answer is clearly Yes—provided that the process can go forward without seriously curtailing the Frenchman's rights and liberties, and without a foreign policy on Russia and Germany so inflexible and so narrow that it threatens the Dunkirk pact. Both conditions could be met if General de Gaulle were to come to power soon rather than late, by vote of Parliament rather than by the authority of a *coup d'état*, pledged to amend the constitution by constitutional means rather than to overthrow it by force.

IT is unfortunate that the French Communists, for different and tactical reasons, may also prefer the promotion of General de Gaulle to the confirmation of Monsieur Ramadier. They see danger for themselves in the General's present tactics; which are to bide his time, to watch the hunger and confusion spread, and to await the surge of demand for order and authority which would carry him to power with unmistakable popular support.

They would like to make him fight now on ground chosen by them: over wages, over food, above all over the issue between east and west, between American aid and dollar dependence on the one hand, and Russian aid and independence of America on the other.

Monsieur Thorez, who has now departed with his wife for Moscow, there to celebrate the thirtieth anniversary of the October Revolution, has thrown overboard the policy of collaboration with other parties of the Left which he maintained during the resistance and after the Liberation against his party's extremists.

Before he left, his Central Committee pledged themselves to follow the Bolshevik precedent of 1917, when "the struggle was waged simultaneously and victoriously against counter-revolutionary Kornilov as well as against Kerensky." In other words, the government of Ramadier or his successor will be fought as ruthlessly as the Gaullist Rally. The tradition of the *Front Populaire* is dead and buried; Mr. Zhdanov read the funeral service over it at Warsaw in July.

THE portents, therefore, are that the Communists can and will make coalition government unworkable. Their future action is likely to be concentrated in the trade unions and in the "committees for the defense of the Republic" which they are setting up pre-

sumably as embryo Soviets, in factories and villages all over France. They will be able to mobilize much inarticulate resentment and open discontent about wages, the cost of living, the bad distribution of food, and the social inequalities which the black market brings into such startling relief.

Every hesitation of American Congressmen to press on with aid to Europe, every hint that strings may be tied to loans and to the Marshall Plan will be used to feed the inflammatory slogan that France's independence is threatened by American capitalism. And, should the Foreign Ministers' conference at the end of this month fail, British and American efforts to get on with the rehabilitation of western Germany will be represented as a betrayal of France's security.

This is a powerful array of weapons and one can only wonder how Ramadier can fight back effectively. The majority of 20 granted to his present government was nothing but a postponement of the verdict on 10 months' desperate grappling with crisis after crisis. Ramadier is already looking for an heir and finding only a familiar trio of aspirants: Monsieur Blum on the Left, Monsieur Herriot in the center, and Monsieur Paul Reynaud on the Right.

If the overriding need is for a Cabinet that can command national unity and enforce new and unpopular plans to cut expenditure and extract more taxes, where is the personality who can divert emotions as well as convince minds? Not, surely, either in the Socialist or the Progressive Catholic or the Republican ranks.

ADMITTEDLY, the Left section of the Socialists has become more conciliatory towards Ramadier since the municipal elections. Conceivably there may still arise what Frenchmen are calling a "third force," strong enough to reject the choice between Right and Left, between west and east, which the Communists and some of the General's supporters are trying to force on the French people.

What happens in France will be anxiously watched by a Europe in which the first stirrings of a revival of the Right can be heard. If that revival gathers momentum, it will be due as much to the Zhdanov doctrine as to the Truman doctrine.

Whatever may have been thought of it in this country, Mr. Zhdanov's speech and the manifesto which accompanied the formation of the Cominform have been taken seriously on the Continent. It is virtually a declaration of political warfare against the moderate Socialists and center parties of the principal western nations. Its first aim is the frustration of the Marshall Plan: "As far as the USSR is concerned"—so runs the Zhdanov declaration—"it will make every effort to prevent the plan being realized."

That, it seems, is now also Monsieur Thorez's first objective; and the persistent reports that Russia has wheat to offer France may point to the tactics that are to be followed. France looks like becoming the center of the European arena in which the battle of the Marshall Plan is to be fought. If that happens, France's neighbors cannot take a strictly disinterested view of the contestants.

AT the moment the initiative lies with the French Communists. Something of significance for them will assuredly come out of the Moscow celebrations which Thorez is attending. If it is to be a signal for direct action, to be fought on the wages question—which comes up on Dec. 1—then one must expect deadlock between government and trade unions. If it is to be moderating advice, a warning against forcing General de Gaulle into action of a kind which might ruin the French Communist Party, then there are some prospects of a "third power" government getting through the winter.

In the first case, the politicians in the center will be driven to make common cause with the General. In the second case, he will be able to choose his time—and his method—for taking office. But in either case a great responsibility rests on the General.

Unfortunately, it looks as if the choice will not be left to the General, as if his hand will be forced. If it is, there should be no doubt about where the responsibility lies and nothing done, either in this country or in America, to make his task more difficult. It is a common interest of all three nations that the Marshall Plan shall be adopted and that it shall succeed. One condition of success is that there should be order, confidence and firm, popular government in France.

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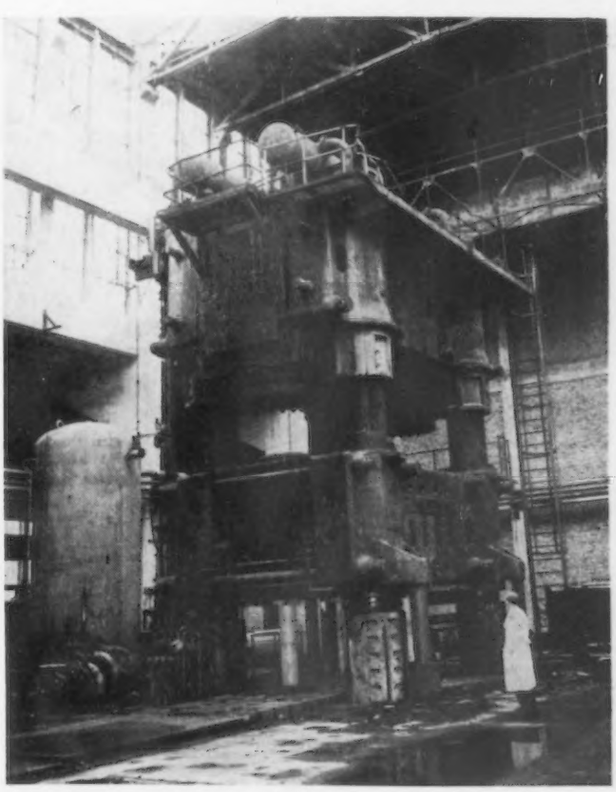


PAYMENT FOR WAR: ***This 15,000-ton power press, which dwarfs the workman looking at it in the Heïderheimer Copper Works, Frankfurt Am Main, Germany, is scheduled to be dismantled under the recently announced reparations program in the Anglo-American zones. The press, the largest type in Germany, was used for making airplane parts during the war.***

o o o

Industrial News Summary...

- **Steel Controls Unnecessary**
- **Quota System Working Now**
- **Scrap Spiral Seems Broken**

THE industrial straightjacket suggested this week by the President if enacted and put into force would mean less steel, rather than more, for those now clamoring for supplies. The only completely successful plan inaugurated during the war after dismal attempts at allocations was the controlled materials plan. This necessitated a tremendous task force which included some of the foremost experts from steel industry ranks. It is unlikely that these men could be gathered together, taken away from their business, in a peacetime period.

During the early part of 1946 steel consumers had a taste of an allocation plan which was partial and which was administered by individuals unfamiliar with the steel distribution problem. Although the total number of priorities only affected about 7 to 9 pct of total steel output, bottlenecks because of the piling up of priorities on specific steel products almost wrecked the postwar recovery distribution picture.

While steel shortages today—when measured against demand—appear greater than at any time since the war ended, the simple reason for this situation is that coal strikes and other stoppages caused heavy losses in steel production. The voluntary quota system inaugurated by practically all steel companies is not perfect. But according to information obtained over a wide front by THE IRON AGE most steel consumers believe it to be the best practical approach until supply and demand are in better balance.

THERE is no situation today in the domestic steel picture which calls for domestic allocations of steel output. If any restrictions are placed on steel production at all, they must include all products. Past attempts at piecemeal allocations have been a dismal failure. With the country in the throes of a booming postwar economy the number and type of steel orders far surpasses the steady and identical types of business which were booked during the war days.

Steel producers this week fail to see by what measure the government or any other group could determine whether steel requirements were essential or nonessential. It was difficult enough during the war to arrive at this demarcation but would be a practical impossibility during peacetime. If the steel industry does not somehow, and quickly, find some way to more adequately satisfy the current demand for steel, some type of restrictions are almost a certainty. They may not be as drastic as those which the President seeks.

Any attempts to place price ceilings on steel products without comprehensive safeguards against higher wage and material costs would eventually react against higher steel production. Steel firms already are struggling with high maintenance and construction costs in order to increase their capacities. Without some margin of profit to draw from it would be impossible to keep present equipment in its most efficient state, to say nothing of adding new capacity.

To say that there was not a fair-sized black market in steel during the war is to fail to recognize the facts. The current gray market, while representing only 5 pct of total steel output, could form a firm foundation for a flourishing black market if strict price controls were put into force. Partial price control would be hardly better than nothing at all. Past experience has proven that production is generally stuffed up on those items which are uncontrolled.

Any price controls which might be placed upon iron and steel scrap would immediately bring into operation a host of dodges, gimmicks, and general "shortcuts." During the war overgrading of scrap was quite common in some areas. Ordinary heavy melting grades were often sold at premium prices under another name. It is doubtful if much tonnage of good ordinary heavy melting steel was sold during the war at so-called OPA maximum prices.

IN the face of threats of controls and restrictions, it appeared this week that steel firms had definitely won their first round in the battle to depress scrap prices. While the Chicago district was the only one to register a specific drop in the average price of heavy melting steel, some other areas were poised for a slightly downward trend. Practically all scrap consumers this week have flatly refused to place any more orders at the recent high level. This unanimity of action has already caused some consternation in scrap circles, and, in some cases, a fear that the market might experience a sharp downward trend. This view is by no means uniform, however. THE IRON AGE scrap composite this week is down 25¢ a gross ton to $41.25 a gross ton because of a drop in Chicago.

Steel ingot output this week stays unchanged at the postwar high of 97.5 pct. It is doubtful that the industry can, for the time being, advance this rate to a much higher level. Normal fluctuations can be expected over the next several months.

While Europe is crying for increased tonnage of American raw and finished steel, the reparations policy in Europe still plans the demolition of just the steel capacity in Europe that is being called for in the United States. Steel experts estimate that at best 65¢ on the dollar will be salvaged from German mills transferred as reparations. But the time lost will be even more important. A bold plan, ignoring the European national boundaries which dictate this folly, would have been the only solution to the problem, short of the easy out—asking for it from America.

• **SHIPBUILDING PLANS**—Launching of a shipbuilding program at an annual cost of $150 million, of which the government should furnish up to $75 million if necessary, is advocated by the White House Advisory Committee on the Merchant Marine. After overage vessels are scrapped and sales commitments have been met, only 2000 ships will be left out of 5400 vessels of the wartime fleet. These are to be maintained as a reserve for national defense. Hence, the report states, 1000 ships of between 11 and 12 million dead-weight tons represents "a reasonable minimum size of an active seagoing merchant fleet." It was suggested that a construction program of about 50 ships a year be considered. This would involve continuous employment of about 75,000 persons and at the same time provide replacement for obsolete vessels.

• **CONVERSION PLUS**—Eastern made steel is finding its way into the midwest but is not sold as a finished product. One thousand tons of Bethlehem ingots were recently converted into sheets at Chicago for a large automaker. A large ingot supplier in Ohio is tooling up to roll slabs. In some cases the conversion customers are paying for cutting the new slabbing mill rolls.

• **MORE COKE**—Directors of Youngstown Sheet & Tube Co. have authorized an immediate expansion of coke production in the Chicago district. Contracts will be awarded for construction of 75 additional coke ovens at the Indiana Harbor plant, increasing production about 35,000 tons per month. The expansion will balance the coke supply with increased pig iron capacity in the Chicago area. One of the Indiana Harbor blast furnaces will be rebuilt next spring and increased from 800 to 1400 tons per day.

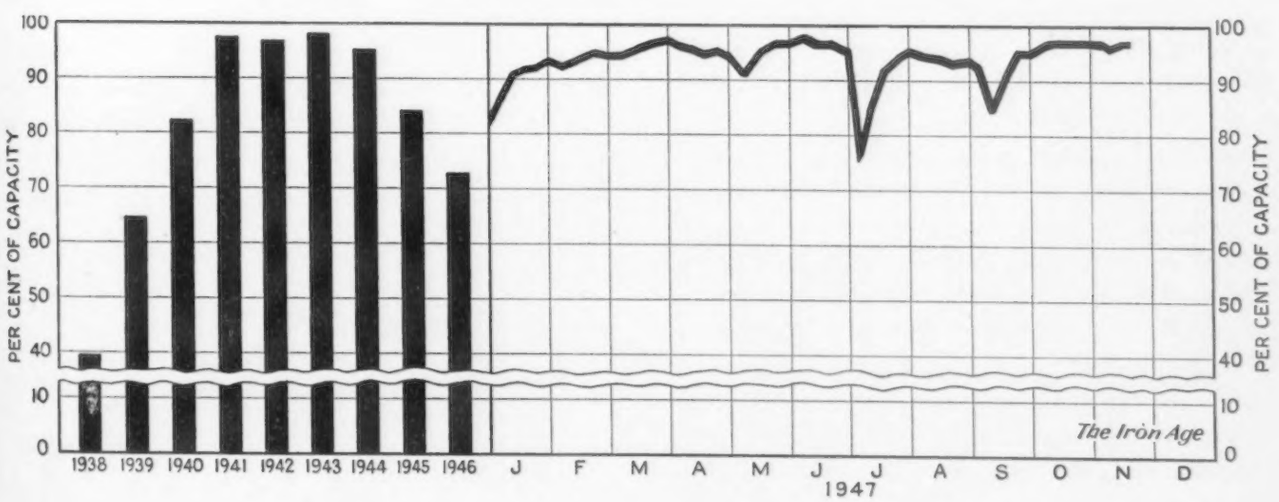
• **NAIL RECORD**—The Joliet Works of American Steel & Wire Co. has established a new weekly record for nail production with the making of 28,723 kegs of nails. The previous weekly record production, set last September, was topped by almost 1000 kegs.

• **TINPLATE RESTRICTIONS**—Orders restricting the use of tinplate for manufacture of containers for beer, coffee, and various nonfood products will be placed in effect shortly by the Commerce Dept. The primary purpose is to conserve tin for the national stockpile. While Mr. Harriman did not state what form the control action would take, how extensive it would be or when it would go into effect, under the Second Decontrol Act, tin allocation powers do not expire until next Feb. 1 and would be invoked. Secretary Harriman said the limitations would be applied gradually and in such a way that production and distribution of products affected would not be "unreasonably affected" and that "every consideration will be given to the impact on the industries involved, especially on small business establishments."

• **AMENDED COMPLAINT**—The American Iron and Steel Institute and 101 steel producers have been named respondents in an amended complaint by the Federal Trade Commission. The respondents, representing an estimated 98 pct of the nation's steel ingot producing capacity, have 20 days in which to answer the government's new charge of conspiracy to hold down added capacity, in addition to the former charge of price-fixing. Although iron producers have been dropped as respondents in the amended complaint, a total of 75 more steel producers have been added to the list of respondents.

• **TIGHT FUEL SUPPLY**—A tight fuel situation this winter and probable serious spot shortages in some areas are foreseen by Interior Secretary J. A. Krug. Mr. Krug declares that present stocks of bituminous and lignite coal amount to a 35-day supply, 5 days above the danger point. Lack of transport has reduced weekly production by a million tons to little more that 12 million weekly. Anthracite production is 8 pct below estimated requirements. With demand for natural gas up 10 pct this year, the supply problem is expected to be most acute east of the Mississippi.

Steel Ingot Production by Districts and Per Cent of Capacity



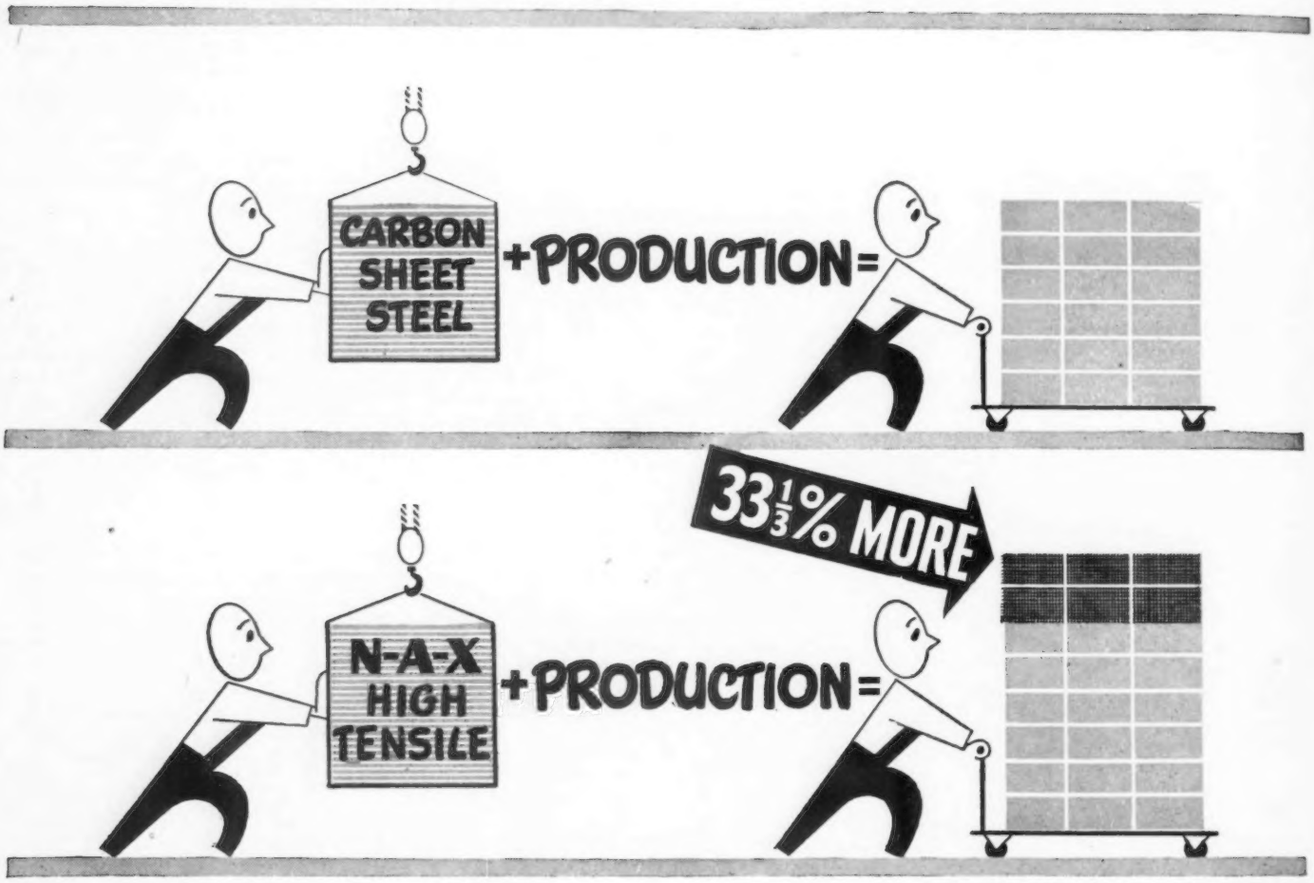
Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
November 11...	104.5	95.5	92.5*	95.0	97.0	102.0	102.0	99.0	103.5*	112.5	103.0	77.5	99.0	97.5
November 18...	103.0	95.0	92.0	95.0	97.0	102.0	102.0	102.0	101.0	110.0	103.0	80.0	94.0	97.5

* Revised.

THE NEW ARITHMETIC IN STEEL

In production per ton—

1 ton N-A-X High-Tensile = 1⅓ tons Carbon Sheet Steel



THE new arithmetic in steel is as simple, understandable—and as well worth remembering—as the multiplication tables.

N-A-X HIGH-TENSILE permits the use of lighter sections—as much as 25% lighter. Less steel is used per unit; more units are produced per ton. Yet finished products actually are stronger and more durable—thanks to the greater strength and toughness, the greater resistance to fatigue and corrosion, of N-A-X HIGH-TENSILE steel.

N-A-X HIGH-TENSILE also has excellent weldability, and can be cold-formed and deep-drawn to exceptional degrees for a high-strength steel.

The tremendous demand for N-A-X HIGH-TENSILE makes it impossible right now to promise normal delivery on new orders. However, our engineers will be glad to show you how to make the most of the new arithmetic in steel in figuring your plans for the future.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

GREAT LAKES STEEL CORPORATION
N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION

Pig Iron Shortage Bringing Marginal Furnaces Into Production

Shortage Pinches Foundrymen And Steelmakers; Short Coke Supply Blamed

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New York

• • • **The shortage of** pig iron, both for steelmaking and for foundry use, is occupying the minds of most producers. Increasing efforts are being made to bring into production marginal blast furnaces, and as the willingness of consumers to pay high prices for pig iron increases, more of these units are being blown in.

In Eastern Pennsylvania, where the position is very acute (see THE IRON AGE, Nov. 13, 1947, p. 159), there is every indication that the old Chester furnace, which belongs to the government, may find its way into production. There have been several groups studying the possibilities in recent weeks.

This unit, which was in operation during the war, and is considered to be a high cost producer, lacks some major equipment essential to operation, and it would be some months before it could be put in blast. It is rated at 123,000 tons of iron per year.

There is one idle blast furnace in Buffalo at the Wickwire Div. of Colo. Fuel and Iron Corp., of two in the district owned by the government. The other is being operated by Republic under lease. The idle furnace has been down since the end of the war, and would require considerable work before being blown in.

In the South, the opening of the Gadsden furnace will afford important relief to the merchant trade. Operating under lease to Republic, this unit is expected to be in operation about the end of the first quarter of next year. Production at Gadsden will be of the order of 18,000 tons per month.

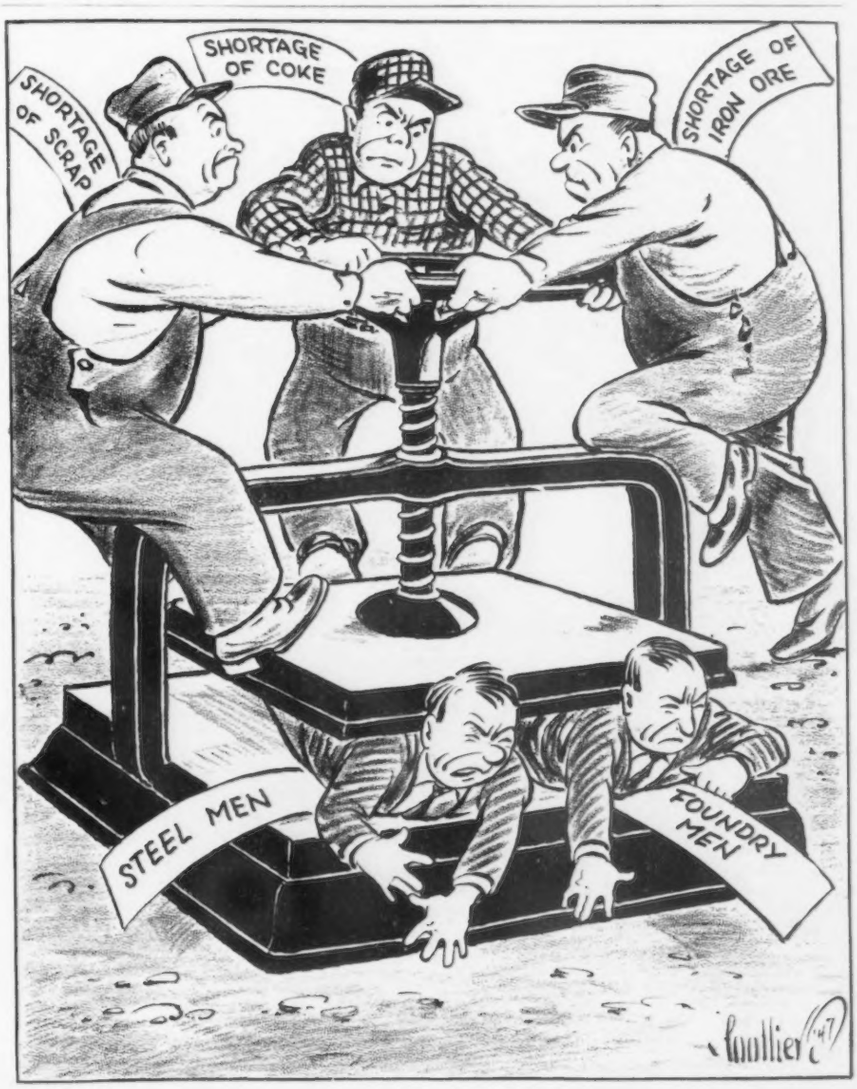
In Texas, the opening of the government owned Daingerfield furnace, which has already been reported, is now alleviating some housing needs. With a $12 per ton subsidy from the housing authority, the f.o.b. furnace price is $36 per ton.

There is still an idle furnace at Rusk, Tex., and there are somewhat varying reports as to the equipment needs before this furnace can be used. Transformers are probably the only major items needed, according to WAA officials. This furnace was built to make charcoal pig iron, but, if used, would probably consume coke from Daingerfield. There is ore available near the furnace. The Rusk furnace would also be a definitely high cost producer.

In the west there is an idle furnace at Ironton, Utah, in addition to the one that is already in regular operation there. A shortage of coke and cars to carry ore are the principal reasons for this furnace remaining closed. It has not been in operation since the war. When it was operating, coke supplies came from beehive ovens located at Ironton, and the results from the furnace during the war were never too good.

All three of the blast furnaces in Geneva are reported to be in operation at present, and some pig iron from Geneva is said to be going to Columbia Steel Corp.

Early this year there was some movement of foreign pig iron into this country at prices ranging from $60 to $75 per ton, but these shipments have largely dried up. There was a period when British "refined iron" could be shipped



from the U. K. without export restriction, but the impending crises in England forced the government there to bar further movements.

The shortage of coke and a deterioration of the quality of coke are important contributing factors to the pig iron situation. A recent estimate by one company indicated that where in 1941 about 1745 lb of coke were used to produce a net ton of pig iron, the 1946 figure is 1868 lb of coke for each ton of iron. Projected on the 1946 figure this consumption would indicate that 3.5 million tons of additional coke will be required to produce this year's pig iron. Coke supplies and new coke oven capacity will also pose a serious problem as new blast furnaces now contemplated are built. There is also considerable agitation in the industry concerning the alleged shipments of metallurgical coal in the big coal export tonnages which are going out each month.

Pig iron men in this country have expressed the fear that, if coal is going out, it is not being used for coke, but is being used for space heating. Considering the desperation with which European steel men have been trying to get a portion of their coal shipments from the U. S. higher grades for the past 18 months, it seems unlikely that they would be dribbling it away carelessly.

There has been considerable shifting of coke supplies when various blast furnaces are down, and the coke ovens at Gadsden and in Eastern Pennsylvania are affording welcome temporary relief now while repairs are going on in blast furnaces.

Steel companies are generally carrying on a limited amount of repair work—only one blast furnace is down in the Pittsburgh area now—although the only merchant furnace in the district is operating on reduced blast. One large producer, which has one furnace down now, has a repair program under way that will keep one furnace closed for the next 18 months, probably at a cost of about 15,000 to 20,000 tons of iron per month. Pittsburgh Steel has bid on a government owned furnace at Monessen which is only 95 pct complete, but cannot get it into production before the second quarter of 1948.

All furnaces in the Detroit area are in production, and in Chicago there are two furnaces down, with the prospect of two more going down before the end of the year.

Advises Foundries To Sort Cast Iron Scrap for Savings

Cleveland

• • • **More than** 150 executives and representatives of 40 meehanite foundries in the U. S. and Canada attended the annual meeting and research program of the industry, held here under the sponsorship of Meehanite Metal Corp.

O. Smalley, Meehanite Metal Corp., pointed out to representatives that during the war the usual standards of economy in the average foundry went by the board. Business was easily obtained and general efficiency was sacrificed for greater production, he said.

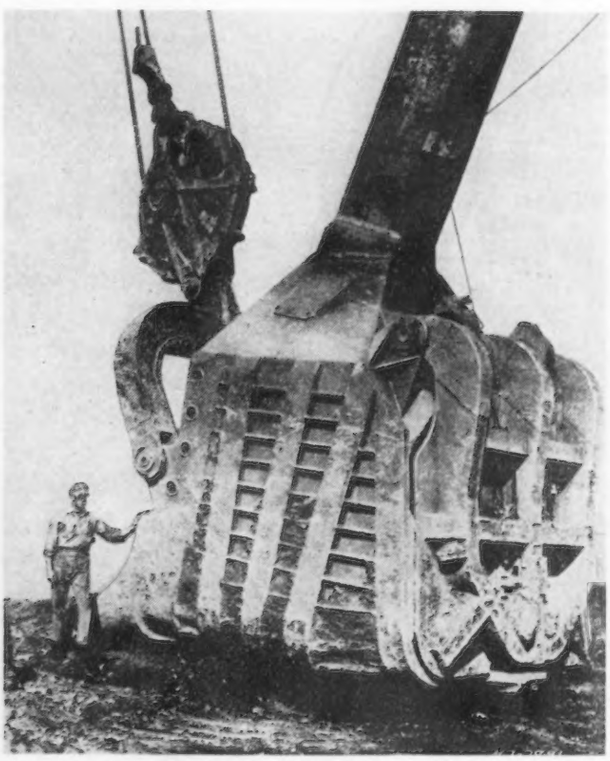
Mr. Smalley said most industries are caught in the vise of mounting costs of operation, with labor and taxes taking a larger share of total income. Profits are declining or have disappeared, and a good percentage of corporations will go out of business as a result.

Mr. Smalley recommended that foundries sort cast iron scrap, which may result in substantial savings. He reported that one foundry found that by sorting scrap and endeavoring to charge material of more uniform size they increased the melting rate from 10 to 12 tons an hr and enabled a hotter and cleaner metal.

Another foundry, he reported, found that prior to the beginning of 1946 they carried only one grade of cast iron scrap, No. 1 machinery. Because of the scarcity of such scrap today they had to conserve what they had. As a result of being forced to sort out nonspecification scrap from each carload, it was decided to use this material for such castings as counter-weights, etc. The last two charges were made up of this inferior scrap and poured into weights.

The market for Meehanite castings in the abrasion resisting field was covered in a paper presented by C. E. Herington, Meehanite Metal Corp., which included mining, clay products, steel coke oven plants, general machinery and the oil industry.

Frank M. Robbins, president, Ross-Meehan Foundries, reported on industrial insurance as it affects the foundry business.



BIG JAWS: *Taking 40 cu yd bites of coal vein overburden 24 hours a day and seven days a week proved too great a task for steel alone and fatigue failure plagued engineers of the Marion Power Shovel Co. Firestone Industrial Products Co. engineers prescribed rubber bushings, and now the world's largest shovel dipper operated near Cadiz, Ohio is on the job around the clock*

Construction Men Told Brief Setback Coming After Boom

Miami Beach

• • • **"The United States** faces a brief economic setback when the forces making for the present boom-like conditions in industry have finally spent themselves" [but] "Once the adjustment is out of the way and the supply of venture funds is enlarged, we shall experience a period of great prosperity."

These forecasts were made by Murray Shields, vice president and economist of the Bank of the Manhattan Co. of New York, when he addressed the annual convention of the American Institute of Steel Construction, Inc. in Miami last week.

"Any prosperity based on high incomes and low productivity is not likely to last," Mr. Shields asserted. He attributed recent spectacular rises in commodity prices to heavy demands for goods to build up inventories, to export, to expand and improve plant capacity and to meet emergency demands for consumers' durable goods. He declared these demands are so urgent that consumers buy almost regardless of price, and it is just a matter of time until substantial readjustments occur in the level of demand.

Mr. Shields also said that the tightening in the supply of funds for new capital expansion will eventually have a constrictive effect on business. "The fact that funds for capital expansion are somewhat less readily available today than they were, may be explained by two basic factors: (1) The rate of saving has been reduced at a time when capital investment continues at a vigorous pace. (2) The supply of investment funds is becoming poorly distributed and less mobile.

To offset the constrictive effect of these factors Mr. Shields declared that the government should encourage capital expansion by permitting higher interest rates on U. S. Securities, by eliminating double taxation of corporation earnings and by making market regulations and margin requirements less onerous.

"Unless ample supplies of credit and capital funds are available, a cutback in capital expansion is likely to undermine the basis of our prosperity. While governmental authorities are studying the problem and are more favorably disposed toward such a program than is commonly assumed, it remains to be seen whether they can or will be able to act quickly enough to prevent a business recession."

Although deeply concerned about the near-term outlook for business, Mr. Shields pointed out that even a recession might be turned to long-term business advantage. "There are vast demands for all sorts of goods which people cannot afford at present prices but which they will buy if prices are reduced." He also pointed out that labor efficiency, now at low-ebb, would be almost certain to rise in the event of a decline in business, accompanied by rising unemployment.

The general opinion on future construction business among convention members bore out the practical aspects of Mr. Shield's talk. Most fabricators believed that consumers had about given up hope that there would be any general lowering of construction costs in the near future. Some jobs which have been held up are now going ahead, and demand over the next 6 to 8 months looks good. The only factor holding back building is the tight steel situation.

Investment Construction Is Going Forward Rapidly In East and South

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By TOM CAMPBELL
News-Markets Editor

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Construction for investment purposes (office buildings and other multi-story constructions which depend on rent for income) is going forward at a fast clip in the eastern part of the United States and in Texas. It may be, according to some construction experts, that the trend for this type of building will show some signs of expansion before it levels out.

The type of construction featured by industrial buildings, the cost of which is borne in the price of finished manufactured products, is going ahead at a fast clip, according to many of those at the convention. There appears to be no reluctance to carrying on such construction or any disposition to hold back because of the price factor.

As far as State and municipal building is concerned, the demand in this field was said to be at a high level. This was particularly true in relation to highway bridges. The construction trend on these is definitely upward.

On the price situation, Mr. T. H. Hendrix, institute statistical director, told convention members that construction costs for the first 7 months of 1947 were almost 90 pct above the average for 1939. He also pointed out that the tons of fabricated structural steel booked per thousand dollars of construction for most classifications, has held its position and in the postwar period has exceeded the years 1939 and 1940.

In 1939 the tons of fabricated steel per thousand dollars of new construction amounted to 0.51, and in 1940 0.63. During the war the tonnage was reduced considerably because of substitutions made necessary by the steel shortage. In 1946 the tons of fabricated

(CONTINUED ON PAGE 120)

Officers Are Elected

Miami Beach, Fla.

• • • The following officers have been elected by members of The American Institute of Steel Construction, Inc.: president, T. R. Mullen, Lehigh Structural Steel Co., New York; executive vice-president, L. Abbett Post; first vice-president, N. R. Patterson, Patterson Steel Co., Tulsa, Okla.; second vice-president, Kirkman O'Neal, Southern Steel Works, Birmingham, treasurer, Clyde MacCornack, The Phoenix Bridge Co., Phoenixville, Pa.; assistant treasurer, L. Abbett Post; secretary and general counsel, M. Harvey Smedley; director of engineering, T. R. Higgins; chief engineer, Jack Singleton; director of statistics, T. H. Hendrix; controller, Paul Leon Price.

Request for Controls Over Allocation and Price Stirs Industry

New York

• • • **Steel leaders** recently have had their say on allocations and controls—they are against them. With the President having asked for allocation powers and authorization to set price and wage ceilings, a granting of such authority and the use of it would definitely bring back the OPA technique.

There are so many ifs in the picture this week that it is anyone's guess as to the ultimate outcome. One thing is certain—should the steel industry be put into a straightjacket of domestic allocations and price ceilings—no group now kicking about the steel shortage is likely to get as good treatment as they are getting now.

After the end of the war, when so-called minor controls on steel output were in effect, the entire distribution system was knocked completely out of balance. Although only a small proportion, about 7 to 9 pct, of total steel output was under government control, ratings piled up to such an extent that certain product priorities affected percentages of mill output ranging from 10 pct to 50 pct.

During the past year the voluntary quota system in the steel industry has not satisfied everyone but reports obtained by THE IRON AGE indicate that most consumers are aware of the complex distribution problem. Steel is now tighter than it has ever been, but steel officials say this is no reason to believe that government allocation will make things any better.

There is at Washington now no group capable of adequately handling any domestic allocation of steel supplies. It is estimated that even if steel companies were willing to send their own task force to Washington it would take 5 to 7 months to build a smooth running organization. Furthermore, current market conditions, even assuming the impact of the Marshall Plan, do not indicate the necessity for domestic allocation of steel supplies, according to information obtained by THE IRON AGE recently.

The imposition of price ceilings on the steel industry would assume that the government can guarantee a stabilization of steel making costs —a guarantee that is most unlikely

Revival of OPA Technique Is Seen in Truman's Request For Extensive Powers

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to be carried out. In the past all attempts to keep raw material costs from rising have been without avail because there was lacking the cohesiveness and the appeal to patriotism which are definite factors during wartime but which are not normal during peacetime.

In order to establish steel price ceilings the government will most certainly have to roll back the price of scrap and at the same time freeze wages—a feat which must yet "tight-rope-walk" its way through Congress.

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Washington

• • • **President Truman** this week asked Congress for restoration of price, rationing and allocation controls in order to avert "a depression from which our economic system, as we know it, might not recover."

In a message personally delivered before a joint session of the two houses, Mr. Truman specifically requested legislation to authorize allocation and inventory control of scarce commodities "which basically affect the cost of living or industrial production." He did not, however, specifically place steel or any other commodity in this category, although the implication in regard to steel was plain.

Mr. Truman warned that our long-range programs "must stress ever-increasing production," and reluctantly took a stand on the steel expansion capacity issue by adding that "we need a long-range program to overcome basic shortages in capacity and equipment."

The reception given Mr. Truman's message was not enthusiastic. Both Republicans and Democrats refrained from applauding the President's references to reimposition of controls. The obvious attempt on the part of the White House to shift responsibility for high prices to Capitol Hill met with a generally cool reception.

Mr. Truman said the immediate approach to inflation and price problems should consist of three types of measures: (1) Reduction of monetary pressures by restraining excessive use of credit. (2) Channeling scarce goods into most essential uses—"steel is too scarce to be used for nonessential purposes." (3) Authorizing the government to impose price ceilings on vital commodities in short supply that basically affect the cost of living. Mr. Truman named these vital commodities as food, clothing, fuel and rent.

The immediate anti-inflation program recommended by the White House calls for the following legislative action, Mr. Truman said:

(1) Restore consumer credit control and restrain creation of inflationary bank credit.

(2) Authorize regulation of speculative trading on the commodity exchanges.

(3) Extend and strengthen export controls.

(4) Extend authority to allocate transportation facilities and equipment.

(5) Authorize measures which will induce the marketing of livestock and poultry at weights and grades that represent the most efficient utilization of grain.

(6) Enable the Agriculture Dept. to expand its program of encouraging conservation practices in this country, and authorize measures designed to increase the production of foods in foreign countries.

(7) Authorize allocation and inventory control of scarce commodities which basically affect the cost of living or industrial production.

(8) Extend and strengthen rent control.

(9) Authorize consumer rationing on products in short supply which basically affect the cost of living.

(10) Authorize price ceilings on products in short supply which basically affect the cost of living or industrial production, and authorize such wage ceilings as are essential to maintain the necessary price ceilings.

Congressional leaders, meanwhile, met in closed sessions to discuss the White House proposals. Typical of the immediate comments made on Capitol Hill is that of Senator Martin, R., Pa., Chairman of the Senate Small Business Committee's Steel subcommittee. "I am definitely opposed to controls, but repeat my comment of last September that if the steel industry does not take steps to get its house in order, it should not be surprised when Uncle Sam moves in as a traffic cop," Mr. Martin told THE IRON AGE.

Weekly Gallup Polls . . .

United States of Europe Finds Considerable Support

Princeton, N. J.

• • • **A federation of European states**—dream of many of Europe's famous statesmen for the last 100 years or more—has a good deal of support from public opinion in leading European nations, according to George Gallup, director, American Institute of Public Opinion.

A round-up of public sentiment in France, Holland, Norway and Sweden by the public opinion institutes shows that the weight of sentiment among those familiar with the plan is distinctly favorable to the idea of a United States of Europe. Support is especially large in France.

Winston Churchill has several times backed the idea of a European federation as the only permanent solution to the political and economic troubles of the European continent. During the early days of World War II Mr. Churchill, as Britain's prime minister, invited France to merge with England into a common nation with common citizenship.

In testing European sentiment on the plan for a United States of Europe, the polltakers found that most voters wanted all European nations included in the federation although some voted to exclude Russia.

The poll first sought to determine how many voters in the various countries had heard of the idea of a United States of Europe.

It was found that more than half were familiar with it, at least in a general way. The percentages claiming to know about the plan were 58 pct in Norway, 55 pct in France, 59 pct in Sweden, and 63 pct in Holland. In the United States, where a similar poll was conducted, 49 pct said they had heard or read about the idea of a United States of Europe.

Voters in all countries were then asked:

"What do you think of this idea?"

The results are summarized in the following table:

	Good Idea Pct	Qual. Ans. Pct	Bad Idea Pct	No Opin. Pct
France	61	—	10	29
Holland	43	2	15	40
Norway	34	6	23	37
Sweden	35	7	24	34
U.S.	55	13	24	8

In each country the voters were handed a list of European nations and asked which ones should be included in a United States of Europe.

Large majorities in each poll indicated that all countries should be allowed to join, with the exception of Russia. In France only 47 pct thought Russia should be included, in Holland, only 33 pct, the United States, 45 pct.

Most friendly toward including Russia were the voters of Sweden, 68 pct of whom said they thought the USSR should properly belong in a United States of Europe.

• • • **A nationwide quiz** test on political names has just been conducted by the institute among voters from coast to coast.

A list of 16 men prominent in national politics or talked about as possible presidential candidates was handed to each voter and the test was to see how many of these men the voter could identify correctly.

Eight of the names proved fairly easy to people. A large percentage could identify President Truman, Gen. Douglas MacArthur, Gen. Dwight D. Eisenhower, Gov. Thomas E. Dewey of New York, Sen. Robert A. Taft, Secretary of State George C. Marshall, Henry A. Wallace, and Sen. Arthur H. Vandenberg.

A smaller majority could identify the next four—Former Secretary of State James F. Byrnes, Sen. Claude Pepper of Florida, Secretary of National Defense James V. Forrestal, and Sen. Alben W. Barkley of Kentucky.

Poll Shows Truman, MacArthur, Eisenhower and Dewey as Best Known of Notable Americans

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On the remaining four names, voters fell down badly. Only half or fewer could identify correctly the names of Harold E. Stassen, former governor of Minnesota, and an announced candidate for president, Earl Warren, governor of California, Joseph E. Martin, Speaker of the House of Representatives, and Harry F. Byrd, senator from Virginia.

Here is the way the test was put:

"Will you please look over this list of names and tell me which of these people you have heard of? Will you tell me who each one is or what he does?

In grading the answers each voter's reply was marked correct if he gave a general indication of knowing the name and identifying it even though the identification was not always specific. Some voters gave positively incorrect identifications; many others simply said they didn't know who the people were.

The results:

	Correct Pct	Incorrect & Don't Know Pct
Truman	98	2
MacArthur	97	3
Eisenhower	95	5
Dewey	91	9
Taft	82	18
Marshall	79	21
Wallace	75	25
Vandenberg	65	35
Byrnes	58	42
Pepper	58	42
Forrestal	53	47
Barkley	51	49
Stassen	50	50
Warren	41	59
Martin	33	67
Byrd, Harry	32	68

USWA Questions Accuracy of Industry Expansion Statements

Says Planned Increases Will Not All Represent a Net Gain in Capacity

Pittsburgh

• • • **The steel industry's** ingot capacity expansion figures are inaccurate, according to the United Steelworkers of America. Otis Brubaker, the union's director of research, so argued last week in testimony before the President's Council of Economic Advisers in which he repeated the union's request for a 10 million-ton capacity increase. He also insisted that production estimates based on 100 pct capacity operation were "tenuous indeed." A union study of wartime capacity expansion was introduced to support the contention that much "expansion" did not produce a net gain in capacity.

He singled out an American Iron & Steel Institute recommendation to the Harriman Committee during preparation of its report on foreign aid. This suggested that steps be taken to wipe out the more than 7 million-ton deficit between current production levels and capacity. The institute, he said, cited scrap, coal and coke difficulties, the 1947 coal strikes, non-operable facilities and low operating rates for bessemer and electric furnaces as limiting factors.

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To arrive at a realistic figure, the USWA spokesman declared, some of this capacity must be eliminated from calculations, as follows:

Facility	Pct of Total Capacity	Tons
Unused or underutilized bessemer	1.1	989,568
Unused or underutilized electric	1.6	1,502,573
Idle U. S. Steel capacity at Geneva	0.55	499,400
Total	3.25	2,991,541

This figure must be subtracted from total rated capacity of 91,241,250 tons, leaving but 88,249,709 tons, or 96.75 pct of capacity, he declared. Thus only about a 4.5 million, not a 7 million-ton, increase is possible if scrap, coal and similar difficulties are licked.

The steel union is aware of the seriousness of the scrap supply problem. However, said Mr. Brubaker, "we wonder . . . whether, perhaps, they are not often 'kidding' just a little bit about the immediate impact that the scrap shortage is going to have on the industry."

The economist told the Council of Economic Advisers that the union had for more than 2 years repeatedly urged the government to lease or dispose of the government-owned blast furnaces. "As of this writing, however," he declared, "there are still some half dozen blast furnaces which are not being operated."

From Jan. 1, 1945 to Jan. 1, 1947, rated capacity of the industry decreased 4,264,030 tons. While plant or facility abandonment may be the major cause, the union research director said, another very substantial cause is simply a rerating of the previously listed capacity.

Mr. Brubaker referred to the industry announcement of plans for increasing capacity by 2.5 million tons annually and to other more recent reports that the total would be 3.5 million tons. "In attempting to evaluate the amount of 'real' capacity expansion represented by these industry plans it must be borne in mind that according to the recent Krug report these estimates were apparently gross estimates and not net capacity increases. Thus at least a part of this promised increase may well be offset by concomitant capacity decreases.

50 YEARS AGO

THE IRON AGE, *November 18, 1897*

• "Those who have been hoping for a very substantial advance in prices, and a great many have harbored that desire, are drifting toward the conclusion that there will be no boom with its chances of extraordinary profits and its long trial of disappointments and losses. In fact, doubts are being expressed as to whether costs will go up quite as much as expected. There have been advances in wages and it is pretty certain that there will be quite a general readjustment in that direction."

• **"A large steel works is being built by the Russians on the Volga. Workmen will live in a model village, each family being assigned a separate dwelling. The Russians are also erecting a new steel plant at Blizyn."**

• "The conviction has become quite general in the iron trade that the most promising field still open for the reduction in cost of manufacture lies in the adoption of economical methods of coking and recovery of byproducts."

• "The most important iron ore discovery on the Menominee range in several years is reported to have been made a few miles from Crystal Falls, Mich. Test drilling indicates the width of the vein must be about 40 ft."

• **"For the first time in many months, all 30 blast furnaces in the Pittsburgh district are in operation. Carnegie Steel Co., Ltd., largest producer, operates 15 of these furnaces with an annual output of close to 2 million tons."**

Electrolytic Iron Powder Being Made By Cheaper Method

Painesville, Ohio

• • • **Butler Brothers** new commercial plant for the production of electrolytic iron powder is now in operation here under the management of Buel Metals Co., a Butler affiliate.

The new plant, which has a capacity of 5 tons of iron powder a day, uses a process developed by Butler Brothers in their laboratories at Cooley, Minn., during the war years. Early in 1945, after extensive investigation, a pilot plant having a capacity of 500 lb of iron powder a day was set up adjacent to the metallurgical laboratory.

Due to a number of engineering changes made in the laboratory and pilot plant, it is expected that Buel Metals Co. iron powders will sell at a price approximately 50 pct less than the commercial electrolytic iron powders now on the market.

Butler Brothers' pilot plant operated for 13 months and produced about 100,000 lb of electrolytic iron powder before being dismantled in May, 1945. This powder was produced for the powder metallurgy field, and was distributed to fabricators in the automobile industry as well as independent fabricators of metal powder parts.

The powder was produced using an iron chloride base electrolyte with ingot iron plates as anodes and stainless steel cathodes. The brittle cathode deposit was removed from the cathode plates and ground to a very fine powder in a Hardinge conical mill.

The resulting powder was then softened by annealing in a box-type brazing furnace at temperatures in the neighborhood of 1600 deg. F. in an atmosphere of disassociated ammonia. The product from the furnace had to be lightly pulverized to restore it to powder form. The final operation consisted of blending the powder to closely controlled specifications.

The iron powder will be used in the manufacture of oil impregnated bearings, gears, cams, rotors and other machine parts, pole pieces, radio cores, clutch facings, and other fabricated products which require machining operations.

Such parts are produced by compacting the powder in accurately shaped dies and subsequently heat treating the pressed powder part in a protective atmosphere to obtain knitting of the particles to form a continuous metal structure.

H. V. Trask, formerly of Butler Brothers, is the general manager of the new plant, and J. J. Cordiano, formerly of Charles Hardy, Inc., is the sales manager.

BUEL METALS COMPANY
Painesville, Ohio
BU-EL ELECTROLYTIC IRON POWDER SPECIFICATIONS AND PRICES

CHARACTERISTICS	100 MESH POWDERS				200 MESH POWDERS	
	TYPE "VCA"	TYPE "CA"	TYPE "DCA"	TYPE "RA"	TYPE "RB"	TYPE "FRB"
PURITY, %	99.6 + Fe	99.6 + Fe	99.5 + Fe	99.6 + Fe	99.6 + Fe	99.6 + Fe
SCREEN ANALYSIS, %						
+ 80 Mesh	1%, max.	.....	.....	.....	.....	.....
− 80 +100	5-10	1%, max.	1%, max.	Trace	.....	.....
−100 +200	45-50	35-40	40-45	15-20	1%, max.	Trace
−200 +325	25-30	35-40	30-35	15-25	25-30	10-15
−325	15-20	25-30	25-30	60-70	70-75	85-90
LOSS IN HYDROGEN, %	0.3 max.	0.3 max.	0.4 max.	0.3 max.	0.3 max.	0.3 max.
APPARENT DENSITY gm/cc	2.10-2.20	2.35-2.45	2.60-2.70	2.60-2.70	2.70-2.80	2.70-2.80

PRICE SCHEDULE
(Based on current wage and material cost levels)

QUANTITY LBS.	PRICE PER POUND	
	100 Mesh	200 Mesh
20	$0.25	$0.29
100	.20	.25
500	.18	.22
2,000	.17	.21
40,000	.149	.185

f.o.b. Painesville, Ohio

TYPICAL CHEMICAL ANALYSIS

Element	% By Weight
Fe	99.88
C	.008
Mn	.019
Si	.006
P	.002
S	.004
Cu	.006
Loss in Hydrogen	.09

Foreign Requirements May Mean Sacrifices For Domestic Users

Washington

• • • **Present steel** requirements for European rehabilitation as laid down by the Paris Committee on European Economic Cooperation may well result in "very heavy and perhaps intolerable sacrifices" on the part of American steel consumers in 1948, the House Select Committee on Foreign Aid said last week.

The committee expressed its opinion in a new report, "United States Steel Requirements and Availabilities," that there are several good reasons to think that fulfillment of CEEC requests as laid down at Paris would place a "much heavier burden" on the U. S. than originally thought.

The CEEC program, if met, would "place our already-beseiged steel mills under heavy fire from both sides," the committee said in its report. "Not only would it preempt a large portion of our rolled-steel output, but in this process and indirectly through scrap and pig imports it would draw from the U. S. immense quantities of metallics, thereby causing almost equivalent cuts in American output of ingots."

"It is difficult to see how, even with drastic cuts in commercial exports, it would be possible to fulfill this program without reducing steel shipments to domestic users well below the first half 1947 annual rate, seriously weakening our own economy," the committee believes.

In the light of the foregoing, the committee finds, it behooves the Congress to subject European steel requirements to the closest scrutiny, particularly with respect to the following subjects:

1—The immense tonnages it is planned to export from the CEEC area. Semiproduct and scrap imports sought from the U. S. are meant to serve as a basis for rais-

Industrial Briefs . . .

• WON'T MOVE — Palley Mfg. Co., which had originally intended to move its steel fabricating plant out of Pittsburgh, will not move, and instead will build a one story addition to its factory here. The firm has also leased a warehouse.

• BUYS NEW PLANT—Syntron Co., Homer City, Pa., manufacturers of vibratory material handling equipment and portable construction and maintenance tools has purchased the former H. K. Porter Co. shell plant at Blairsville, Pa.

This mill type building with cranes, mono rails, indoor railroad loading platforms, etc., will add 100,000 square feet of modern, up-to-date, heavy manufacturing facilities to their main plant at Homer City.

Syntron plans to transfer the manufacture of its large, heavy duty vibratory feeders and conveying equipment to Blairsville, which will release space at Homer City, to take care of new products and increased production of its present lines of Electric Tools, Gasoline Hammers, Concrete Vibrators, Paper Joggers, Shaft Seals and other products.

The Company's general offices and headquarters will remain at the Homer City, Pennsylvania plant.

• MERGER—The Solvay Process Co., Solvay Sales Corp. and General Chemical Co. have been merged into their parent company, Allied Chemical & Dye Corp. Operations will be conducted as heretofore.

• CUYAHOGA OPEN HOUSE—An estimated 25,000 people attended an open house held recently by the Cuyahoga Works of American Steel & Wire Co., Cleveland.

• ENDOWS PROFESSORSHIP — Cornell University has announced the establishment of an endowed professorrship of metallurgical engineering named for Francis Norwood Bard, owner of the Barco Mfg. Co. of Chicago.

• SIGNS LEASE—Lustron Corp. has signed a lease with the WAA for rental of a war surplus aircraft plant in Columbus, Ohio, which will be converted to the production of factory-built houses of porcelain enameled steel for veterans.

• ANNIVERSARY — An open house and plant tour will be held Dec. 13, at the Stewart-Warner Corp. plants at Chicago to mark its thirty-fifth anniversary.

• PURCHASES METAL PLANT — The Apex Smelting Co., Chicago, has announced the purchase of the National Smelting Co. of Cleveland. The new plant will begin operations Jan. 2, 1948, and will produce aluminum, magnesium and zinc base alloys.

• NAMES DISTRIBUTOR — Appointment of the Mormon Belting & Supply Co., Milwaukee, as distributor for the Parker Appliance Co., Cleveland, has been announced. The Mormon Co. will handle the complete line of fluid-handling equipment.

• CHANGES NAME — The Milwaukee Crucible Steel Casting Co., Milwaukee, has changed its name to Crucible Steel Casting Co. in a phase of its reorganization under the federal bankruptcy laws and the new corporation will take over the assets of the old company.

• OUT OF THE RUINS — Wells Mfg. Co., Fond du Lac, Wis., is rebuilding the plant section destroyed by fire in 1943 and the new 2-storied annex will increase production facilities on automotive ignition parts.

• TO INCREASE PRODUCTION — Crosley Motors, Inc., is beginning an expansion program to increase its Cincinnati engine plant facilities by 21 pct and its final assembly plant at Marion, Ind., by 40 pct.

ing CEEC exports very greatly above their level in the last full prewar year. Also, import requirements for sheets are very heavy in 1948 and 1949 and there is a large annual demand for hot-finished strip and tinplate throughout the three-year period.

2—The availability of metallics abroad. Cursory review of the CEEC steel report figures raises these real questions: (1) Whether the total volume of metallics shown as available for steel ingot production and foundry pig iron needs is not more than sufficient to support the estimated furnace output, (2) Whether the estimated home scrap supply figure is not too low in relation to the recirculating scrap tonnage one would expect to arise from forecast home steel production plus a reasonable allowance for obsolescent scrap.

3—The possibility of increasing Western Germany's steel ingot production at a more rapid rate than envisaged at present. Current schedules call for a total of only 4.5 million net tons in Bizonia during 1948, with jumps to 6.1 million net tons in 1949; 8.3 million net tons in 1950, and 11 million net tons in 1951.

4—The home steel consumption estimates given for several of the countries. A review of CEEC conversations in Washington indicates that a careful check of some estimates would prove rewarding. Can European steel expansion programs be afforded at this time: What about future markets?

With respect to coal, the committee finds that requests for shipments from the U. S. are "within the physical capacity of the U. S. coal mines and coal resources." Shortage of railroad cars may well prove to be the only hitch to fulfillment of the original request.

The Harriman committee, continuing its study on the availability of U. S. goods, issued a supplemental statement. "It is clear that only part of the stated needs can be met by additional exports from the U. S. While some additional cost would be involved, the requirements might be met by bringing idle bessemer and electric furnaces into operation, were it not for the material problem. This should be the subject of continuing study."

Special Report . . .

Scarcity of H-R Sheet Due to Technological Advance

Pittsburgh

• • • **Where are the hot-rolled** sheets in the lighter gages? A nefarious conspiracy by steel masters is keeping them off the market in favor of cold rolled products at a higher price! So runs the charge of a number of interests which would like to buy this item.

Not a conspiracy, say the steel producers—to whom the very word is anathema—but technological progress. Broadly speaking, the development of the continuous cold mill has meant the end of hand mills for economical production of light gage carbon steel sheet. The continuous hot mill can not roll to the thin gages the hand mill can. There are few hand mills left. Those still operating and selling in the open market have to put more labor into the thin gage hot-rolled sheet and so charge more for it. According to steel mill engineers, that is the story of the light gage hot-rolled steel "shortage."

Hot-rolled annealed sheet, 19 gage and lighter, is currently quoted at a base price of $3.65 per 100 lb. Cold-rolled sheet, 19 gage and lighter, is $3.55, or $2 a ton less. Hot-rolled sheet, 18 gage and heavier, sells at $2.80. (When hot-rolled sheet is produced in gages of 19 and lighter it must be annealed or normalized to make it suitable for forming or stamping.) These are the prices that have caused some confusion in the minds of sheet users. Why, they ask, should there be a $16 difference in the price of two apparently consecutive gages of hot-rolled sheet?

The answer is that hot-rolled sheet, 18 gage and heavier is a product of the continuous hot mill; in 19 gage and lighter it is made by hand — or pack — mill. Cold-rolled sheet is a product of the continuous hot mill and the continuous cold reducing mill; the cold mill takes the hot mill's sheet —which can not be lighter than 18 gage—and is capable of further reducing it.

Sheet steel salesmen say their customers are getting a better product in the cold-rolled steel available today. Those consumers who don't need this quality maintain they should still be able to buy thin hot-rolled sheets for considerably less than the cold rolled product, since the quality is admittedly lower. To explain the apparent anachronism they detail the development of sheet rolling, beginning with the old hand mill.

The setup required to turn out hot-rolled sheet is commonly called a pack mill. Starting with a pair of properly heated sheet bars the helper puts one through the breakdown or roughing mill—by hand, with a pair of tongs. The catcher on the opposite side of the mill takes it as it comes through and passes it over the top roll as the second bar is fed through the rolls. These operations are repeated, generally until the bar is about half the length of the sheet desired.

The next operation, for ordinary quality carbon steel sheets, is processing in the pack mill. If the sheet is to be lighter than 16 gage, reheating is necessary; if heavier, it can usually be completed without reheating. Where a sheet is to be 14 to 18 gage it has to be doubled after it comes through the rolls. It is seized by tongs and doubled back on itself, the crease flattened with a power hammer, and passed through the mill again. To get thinner gages a doubled pack may be doubled again and again until eight or more sheets are being simultaneously passed through the mill in one pack. After each hand doubling operation the sheet must be reheated before rerolling.

Finally, one end of each sheet in a pack has to be caught with tongs and given a powerful snap to separate it from the rest. Improper heating may cause the sheets to stick or weld together, or scale may form, so that high individual skill is said to be required of the operating crew. Further, special analysis steel is essential.

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

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This product is then pickled and annealed, annealed, normalized, oiled, given a light cold-rolling pass to improve the surface, or combinations of these final treatments.

A mill installed at Ashland, Ky., by American Rolling Mill Co., in 1923, proved to be the first successful continuous hot strip mill. It began with the ingot and rolled sheets of 22 gage and heavier, up to 36 in. wide. In place of the hand operations of the pack mill described above, the continuous hot mill can take the ingot from the soaking pit and put it through a slabbing mill. Often the slab is cooled and conditioned—the latter operation still requires much manual work—before reheating. The reheated slab goes through a descaler, on to a mill to widen the slab, then to a roughing mill and into the continuous hot sheet or strip mill.

This operation produces hot-rolled sheet of just about the gage the hand mill produced. But instead of getting thinner gages of plain carbon steel by pack rolling, the product of the hot mill is fed, after continuous pickling, to the cold-reduction mill. The cold reduced product admittedly has better physical properties, surface finish and dimensional accuracy. In fact, steel mill metallurgists also say that the continuous hot mill yields a product comparable with normalized or annealed sheets from the pack mill.

From the standpoint of economics, the demand on the steel industry has been for more and more cold-rolled material, hence most of the expansion has gone in this direction. The objective has obviously been to meet this demand, for therein lie the profits. Without the continuous tech-

(CONTINUED ON PAGE 141)

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

1200 Tons, St. Paul, parts plant for International Harvester Co. to Gage Structural Steel Co., Chicago.

640 Tons, Santa Clara, Calif., warehouse for Owens-Corning Fibreglas Corp., through Bechtel Corp. to Bethlehem Pacific Coast Steel Corp., San Francisco.

315 Tons, Park County, Wyo., state highway bridge S268-3 to Pittsburgh-Des Moines Steel Co., Pittsburgh.

235 Tons, Greenlee County, Ariz., Duncan bridge, Clifton-Duncan highway, through Vinson Construction Co. to Allison Steel Co.

200 Tons, Martinville, Ind., substation for Indiana Power & Light Co. to Pan American Bridge Co., New Castle, Ind.

170 Tons, Orange, Tex., river crossing for Gulf States Utilities to Lehigh Structural Steel Co. through Stone & Webster Engineering Corp., Boston, engineers.

140 Tons, Jackson County, Ill., bridge span through State Highway Dept. section 11-F, Illinois Steel Bridge Co., previously reported low bidder, has been awarded the contract.

140 Tons, MacCoupin County, Ill., bridge span through State Highway Dept. DX-SF, previously reported Bethlehem Steel Co. as low bidder. Bethlehem has been awarded contract.

100 Tons, Monsanto, Tenn., storage terminal for Ethyl Corp. to Bristol Steel & Iron Works, Bristol, Va. through Stone & Webster Engineering Corp., Boston, engineers.

• • • **Fabricated steel inquiries** this week included the following:

1200 Tons, Hartford, Conn., South Meadow power station for Hartford Electric Light Co. Stone & Webster Engineering Corp., Boston, engineers.

700 Tons, Chicago, board of education elementary and high school building reported recently as 1000 Tons. American Bridge Co. was the only bidder. Award not yet made.

300 Tons, El Paso, Tex. power station for El Paso Electric Co. Stone & Webster Engineering Corp., Boston, engineers.

150 Tons, New Orleans, sector gates for east and west Calumet floodgates, bids due Dec. 19.

• • • **Reinforcing bar awards** this week included the following:

600 Tons, Minneapolis, Aero Building for University of Minnesota Hagstrom Construction Co. Previously reported low bidder. Paper Calmenson Co. will supply the steel.

195 Tons, San Bernardino County, Calif., highway construction between Los Angeles County line and Ontario, through Morrison-Knudsen Co., Inc. to Southwest Steel Rolling Mills.

165 Tons, Greenlee County, Ariz., Duncan bridge, Clifton-Duncan highway, through Vinson Construction Co. to Allison Steel Co.

• • • **Reinforcing bar inquiries** this week included the following:

525 Tons, New Orleans, east and west Calumet floodgates, bids due Dec. 19.

130 Tons, Chicago, Dearborn St. subway. Project P-9B. Bids closed Nov. 13.

105 Tons, Minneapolis, highway laboratory for State of Minnesota Steenberg Construction Co. Previously reported low bidder. All bids have now been rejected as they were 100 pct over the estimate.

• • • **Steel piling awards** this week included the following:

295 Tons, Greenlee County, Ariz., Duncan bridge, Clifton-Duncan highway, through Vinson Construction Co. to Bethlehem Steel Co., Bethlehem.

Construction Men Meet

(CONTINUED FROM PAGE 113)

structural steel per thousand dollars of construction amounted to 0.64 and for the first seven months of this year had climbed to 0.70.

It was apparent from remarks at the convention that steel would be tight for some time. This will be true especially for steel plates. The latter must compete with flat rolled products (sheets and strip) for available steel coming from the slabbing mills.

It is recalled that a substantial increase in sheet and strip capacity will be brought into production in 1948. It is doubtful if a like amount of ingot capacity will be available at the same time. This means that structural steel departments in steel companies must fight hard to get their share of available structural plate products.

In his annual report, T. R. Mullen, institute president, was quite optimistic over the outlook for construction business. According to him, reports from the institute's engineering staff, indicate a high level of business for some time.

In his paper on the construction business and whether it was headed for a boom or a bust, E. T. Blix, manager, Mississippi Valley Structural Steel Co., Melrose Park, Ill., warned that any recession should be considered as a price adjustment period and not as a major depression. Reviewing pent-up demand, Mr. Blix, said that there was no reason to become panicky. It was his opinion that even if the fabricated structural business leveled off at some future date the volume at that time would be considerably greater than in the prewar period.

'Push Towing' Pushed in SA

Pittsburgh

• • • **Dravo Corp.** announces receipt of an order from the Ministry of Public Works of Argentina for 10 welded steel sand and gravel barges. The barges are to be fabricated at Neville Island and shipped "knocked down" to Buenos Aires.

The vessels will pioneer in the movement for adoption of the "push towing" method in South America, adding to other Dravo equipment there. They will be used principally on the Parana, Uruguay and Paraguay Rivers in Argentina. The first towboat and its complement of barges has already been delivered at Buenos Aires and are in service.

Coming Events

Dec. 1-3 Society of Automotive Engineers, air transport meeting, Kansas City.

Dec. 1-5 American Society of Mechanical Engineers, annual meeting, Atlantic City, N. J.

Dec. 1-6 Twenty-First Exposition of Chemical Industries, New York.

Dec. 4-6 Electric Furnace Steel Committee, AIME, annual conference, Pittsburgh.

Dec. 11-13 Electron Microscope Society of America, annual meeting, Philadelphia.

1948

Jan. 12-16 Society of Automotive Engineers, annual meeting, Detroit.

Jan. 12-16 National Materials Handling Exposition, Cleveland.

Jan. 19-20 Institute of Scrap Iron & Steel, Inc., annual convention, Chicago.

Feb. 10-11 Pressed Metal Institute, annual meeting, Buffalo.

Feb. 15-19 American Institute of Mechanical Engineers, annual meeting, New York.

Mar. 3-5 Society of Automotive Engineers, national passenger car meeting, Detroit.

Mar. 18-19 Magnesium Assn., annual meeting, New York.

Disposal of Surplus Plants by WAA Proving Difficult Task

Washington

• • • **Disposal of** manufacturing plants and other real property still remains the chief problem of the War Assets Administration in unloading its eight to nine billion dollars worth of domestic war surpluses.

Administrator Robert M. Littlejohn has set next July as the probable termination date of WAA as such, expecting at that time to turn over remaining surplus inventories to a permanent government agency or agencies. By that time, the WAA head forecasts in his report for the 1947 third quarter, inventories will have been reduced to slightly more than $3 billion, including that yet to be declared. More than 75 pct of this remainder is expected to consist of real property.

In recapitulation, the report states that only $1.3 billion in surpluses remains to be declared, bringing the final total of domestic war leftovers to $29.5 billion in acquisition cost. To date, about $21 billion worth has been disposed of in one way or another, including about $4.8 billion in real property. Nearly half, or $4.1 billion, of the remaining $8.5 billion consists of varying types of real property.

"A number of years will be required to effect complete liquidation of the government's real property inventory," declares Littlejohn. Several factors confirm this.

One major reason is that the cream of surplus plant facilities was skimmed off during the earlier phases of the disposal program. WAA has accepted custody of approximately 1750 plants and properties, including airfields and military camps, of which about 1200 have been disposed of through sale, lease or donation.

This leaves WAA with 550 less desirable properties on its hands and for which it is currently expending $2 million a month for protection and maintenance. This includes 280 airports but does not include some 219 manufacturing plants which have been leased to private operators for periods ranging from one to several years; most of these eventually will be returned to the government for disposal.

Undesirability of Remaining Plants Proving Biggest Deterrent to Sales

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By KARL RANNELLS
Washington Bureau

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Undesirable features of some plants still held by WAA include scrambled facilities so intermixed with private property that they are usable only by the wartime operator or for scrapping. In many instances, the former operator does not want them.

Others are of such size that no single purchaser desires them; WAA has made temporary disposal of a few of these by arranging multiple tenancy leases. This does not solve the problem in respect to relinquishing government ownership. Also, some of the larger corporations which, even though they could use them, must take into consideration the anti-monopoly statutes which might prohibit such a purchase.

Perhaps the most effective brake on disposal, other than the pure white elephants, are national defense requirements and the government itself.

Under Public Law 364, 80th Congress, the military services may restrict disposal of government-owned wartime industrial facilities in the interest of national security. Under the authorization, the Munitions Board has designated 177 plants which may be sold or leased only on agreement that the plant is maintained in varying stages of standby condition — usually, such that the plant can be reconverted in not less than 60 to 120 days.

Still another statute, Senate Concurrent Resolution No. 31, prevents until March 15, 1948, the disposal of certain types of non-industrial property, the disposal of which may be affected by pending legislation or in which states or municipalities have evidenced an interest. Under this legislation, WAA has frozen the disposal of another 87 properties having an original cost of more than $100 million.

Thus, including the 219 plants under lease, WAA has a total of 483 plants, the final disposal of which may be delayed indefinitely; its immediate problem is the disposal of 286 others which have no strings attached except dubious desirability.

An additional reason for speeding up disposal is the declining rate of return; this has dropped from better than 30 pct of original cost (for all surplus) to about 15 pct. Disposal costs amount to about one-fourth of sales realization.

In an effort to speed disposal, authority has been delegated to the six zone offices — subject to overall and policy direction from Washington. It is estimated that about 70 pct of industrial and 95 pct of non-industrial properties may be disposed of in the field without referral to Washington. Properties having an original cost of $1 million or more must have Washington approval, including that of the Dept. of Justice.

If there is but one potential purchaser, because of a scrambled nature or other reason, direct negotiation for sales may be carried out. Proposals that disposals be made by public auction when other methods fail are being given serious consideration.

The latest WAA move in selling industrial property has been put into effect—selling through reputable real estate brokers who will receive a sliding scale commission on each sale. Instructions on procedure as well as broker applications have been sent to the six zone offices.

There will be no competitive selling. Each plant selected for sale under the program will be listed exclusively with an individual broker or firm; other than the pamphlets and other promotional material already available at WAA, each broker must provide for all advertising and promotion.

Complaints of Unfair Dealer Practices Plague Auto Producers

Producers Tackle Difficult Task of Appeasing Their Consumers, Dealers

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By W. G. PATTON
Detroit Regional Editor

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Detroit

• • • **It seems there** is no wrath like that of an unsuccessful new car buyer or a successful new car purchaser who thinks he's been pushed around by his dealer.

Auto executives admit they are receiving hundreds of angry complaints from consumers alleging padded prices, shuffling of buyers' lists, packing cars with accessories and unfair allowances on used cars.

Where charges against the dealer can be proved, the auto companies insist they are ready to act decisively. One company admits that six of its dealer franchises have been cancelled following proof of charges against the dealer. In other cases, dealers caught selling new cars to used car lots have been "requested" to buy them back at whatever price the used car dealer wanted to charge.

Several car producers say they have men in the field contacting dealers all over the country, asking questions about certain transactions in which car buyers have reported to the central office that they received unfair or dishonest treatment. Where the evidence is sufficiently convincing, the auto executives say, the investigation is often carried back to all the individuals involved in the case.

Auto producers are not saying much for publication about the action that is being taken to curb their profit-mad dealers. Much of the disciplining that is being done takes the form of personal visits by the manufacturer's representative to the dealers' establishments or haranguing at dealer meetings. Occasionally, however, a story gets out indicating that the car producers are acting to protect new car buyers where, in their judgment, such action is warranted.

Quite recently, for example, THE IRON AGE received the following unsolicited letter from a reader of the Assembly Line.

"I noted with interest the letter published by you in a recent issue regarding the complaints of a new car purchaser who had been shaken down for a so-called bonus.

"An acquaintance of mine had an experience in which this person might be interested. After having his name on the "list" for several months, he was advised that his name had finally reached the top of the list and a new car of the approximate specifications desired had arrived. On going to the salesroom to make the purchase, he was advised that all that was holding up the sale was the small matter of a $200 "service charge."

"My friend told the dealer to keep his car and went home and wrote the manufacturer a letter that could be written only on asbestos paper. Four days later the owner of the agency called my acquaintance on the telephone and asked him to call and select the car that he desired from their stock and further that the cost would be only the f.o.b. manufacturer's price plus taxes and the normal delivery charges and that anything such as "service charges" or "bonuses" must have been a complete misunderstanding!

"In view of the letters damning the manufacturers as well as the dealers, I feel you would be interested in this incident."

The question most frequently asked auto executives, it appears, is, "Why don't you make an example of a few of your dealers, publicize the disciplinary action you take and then maybe your dealers would get the idea you mean business?"

Car producers say one reason they don't publicize the disciplinary action they take is that this may easily lead to costly lawsuits. Some sources believe there is also to be considered the lingering suspicion of many auto dealers that car manufacturers have always pushed them around. Before the war many automakers were doing everything possible to build up dealer goodwill. They have no desire to ruin the benefits of these programs. Also, some states require approval by motor vehicle departments of auto dealer cancelations.

Auto producers have also tried stating their case frankly to the public, they say, but the results have not been all they hoped for. Recently, for example, an auto sales executive made a speech in Cleveland outlining his company's position toward its dealers in a straight-from-the-shoulder manner. He was loudly applauded, both by his audience and the press. Within three or four days, it is reported, he received more than 80 letters which started out, "We greatly admire the position you took the other day about distributing your new cars, therefore I am sure you will be willing to help me obtain the car I have had on order for 16 months, etc."

One of the greatest obstacles in dealing with the vast amount of "fan mail" that is accumulating in auto executives offices in Detroit, it is reported, is that the charges against the dealers are often of a general nature. For example, Mrs. Joe Zilch writes the Universal Motor Co. that her brother, Zeke, knows a man who actually saw a Universal car dealer take $500 under the counter.

In other cases, there are no written orders or witnesses to prove that the dealer did wrong by his customer. Most of the charges vanish into thin air, according to one auto official, as soon as the complainant is asked to submit a notarized statement outlining his charges against the dealer. Also, they say, many an irate buyer has

Washington

• • • **Treasury Dept., spurred by unfavorable buyer reaction against auto dealers (THE IRON AGE, Oct. 30, p. 45), is investigating dealers' income tax returns. Evidence now on hand shows that in one large Eastern city several auto dealers have been greatly undervaluing trade-in cars, reselling the cars at high prices, and then attempting to evade income taxes by omitting the profits of these transactions from income tax returns.**

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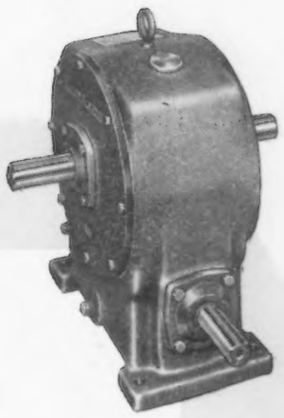

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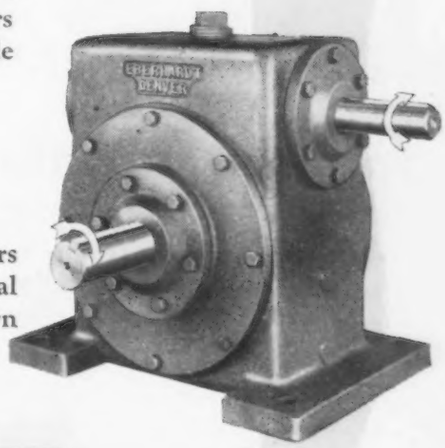

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A standard line of 12 heavy duty reducers are available for prompt shipment, or special reduction units will be built to your own specifications.

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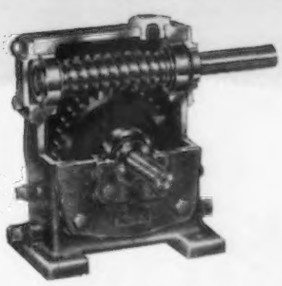
Worm and shaft are integral . . . worm is hardened, ground and polished.



Worm gear is made of high grade gear bronze with generated teeth.

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USE THIS COUPON

Gentlemen: Please send me your worm gear Speed Reducer Catalog and advise name of your distributor in this territory.

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IA 1120

requested to be excused when he was asked to make his charges in person against the dealer in the presence of an auto official.

Most of the car producers say they will investigate charges against the dealer when the charges are specific and there is adequate written evidence or a witness. Chevrolet, for example, recently disclosed that the company has made several thousand individual investigations in all parts of the country to determine whether new cars were being sold to used car lots by Chevrolet dealers.

According to Chevrolet officials, the investigation shows that more than 98 pct of the new Chevrolets on used car lots have been traced to individuals who bought them from authorized dealers through the usual channels.

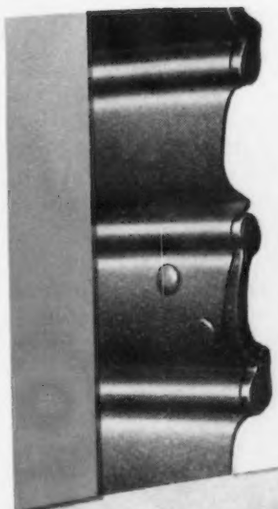
Each of the auto companies contends that a high percentage of its time has to be spent nowadays investigating such charges against its dealers. Despite the fact that many of the charges cannot be substantiated, they say, the letters received from the public are helpful in spotting a dealer who is operating in a questionable manner. In the final analysis, this may be the most helpful result of the flood of letters now reaching Detroit.

Car manufacturers admit they have found no satisfactory solution for the problem of distributing their cars in a manner that will come even close to satisfying the public. Just as long as cars remain in short supply, they say, and the public is willing to rebuy and resell cars at a fat bonus price the industry will continue to face harsh criticism.

The findings of a Detroit Grand Jury and the results of a recent survey which indicated that 48 pct of a group of recent purchasers of new cars thought they had been treated unfairly by their dealer has knocked the props out of a lot of complacency in the auto industry. Informed sources here now believe that restrictions on dealers are going to be tightened. Also, where the agreement between the auto manufacturer and his dealer is sufficiently flexible, dealers are going to find themselves involved in discussions with the home office.

According to auto sales executives, the problem of distributing

Rolling Steel DOORS



One of Three Standard Interlocking Slats that make up the Rugged Curtains of Mahon Rolling Steel Doors.

Manually • Mechanically • Power Operated

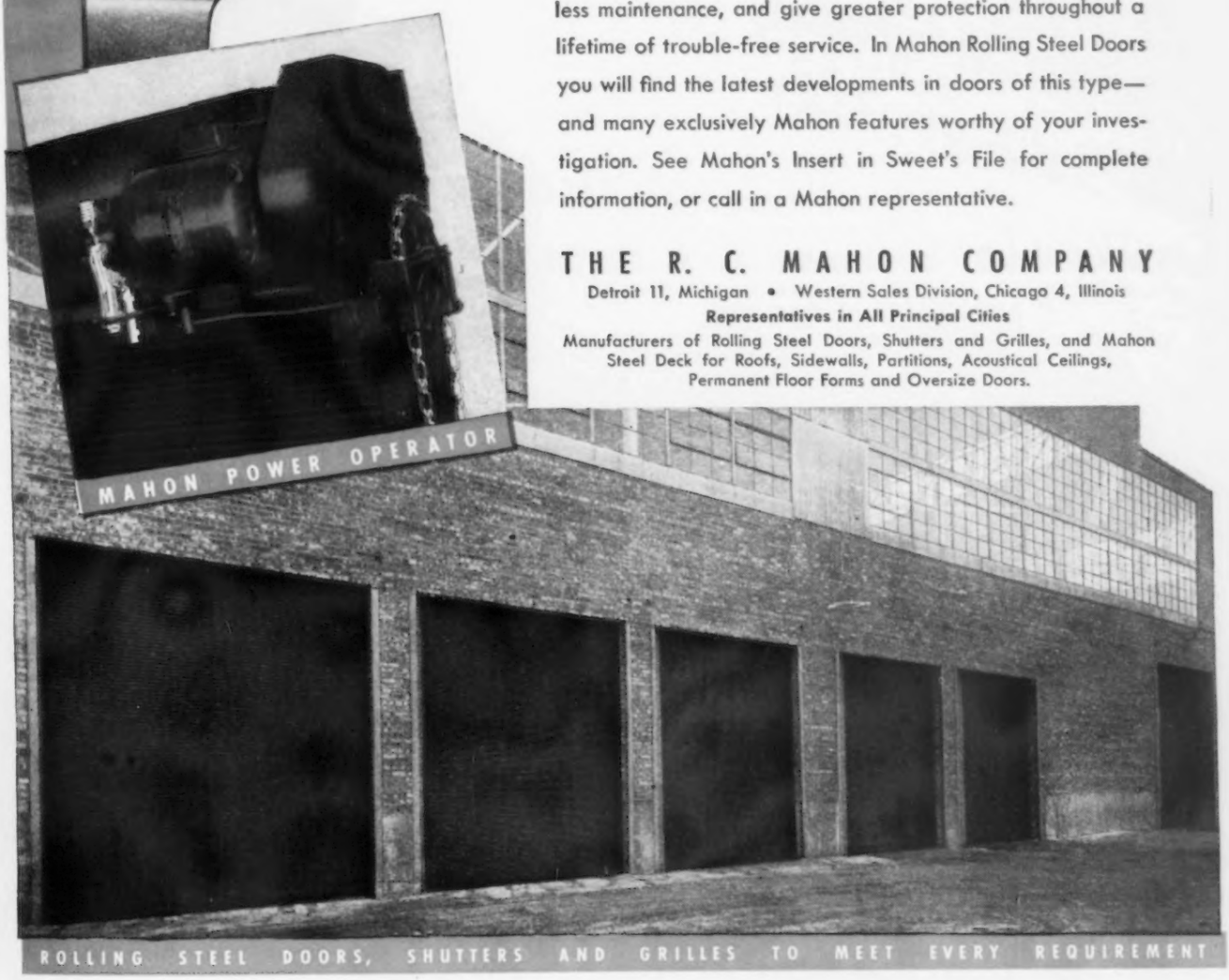
For any shipping, truck, or railroad opening in commercial or industrial buildings, Rolling Steel Doors are the best investment you can make . . . they consume less space, require less maintenance, and give greater protection throughout a lifetime of trouble-free service. In Mahon Rolling Steel Doors you will find the latest developments in doors of this type—and many exclusively Mahon features worthy of your investigation. See Mahon's Insert in Sweet's File for complete information, or call in a Mahon representative.

THE R. C. MAHON COMPANY

Detroit 11, Michigan • Western Sales Division, Chicago 4, Illinois

Representatives in All Principal Cities

Manufacturers of Rolling Steel Doors, Shutters and Grilles, and Mahon Steel Deck for Roofs, Sidewalls, Partitions, Acoustical Ceilings, Permanent Floor Forms and Oversize Doors.



ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Mahon Rolling Doors Installed in the Plant of the Lafayette Steel Company, Chicago, Ill. A. F. Stein & Sons, Inc., Engineers. Poirot Construction Co., Contractors.

MAHON

cars centers around the ability of the car manufacturer to control the policies of its dealers. According to one car manufacturer, once the car is sold to the dealer the manufacturer has no more legal control over the dealer than the manufacturer of clothing or mousetraps has over his dealers. Markups in other industries are not controlled, this executive asserts. Also, he contends, profit margins are even less uniform in other industries than they are in the auto industry.

At the same time, the auto industry recognizes that something has to be done. Repurchase certificates under which the buyer agrees to keep the car or sell it back to the dealer are gaining in favor, according to T. H. Keating, general sales manager of Chevrolet. Other auto officials admit, however, that the legal status of such agreements has not been established. Some customers have argued that dealers should also be required to sign a certificate wherein the dealer agrees that any car taken back will not be resold at an additional profit to the dealer.

The charge most frequently made against auto dealers is that they shuffle their order list and are guilty of packing cars with accessories. Many dealers admit that this is true to the extent that they give preference to certain classes of buyers such as veterans, amputees, physicians and public health officials. Most dealers also argue it necessary for them to favor persons who are likely to become permanent customers of the dealer's establishment.

One of the strongest arguments the dealer has for not following orders in chronological order is that in doing so he is giving the legitimate new car buyer an even better break than he would get otherwise. "The people who have placed orders with a half dozen or more dealers are the very people who are most likely to sell their car to a used car lot," the dealers say. "Therefore, it is necessary for us to screen orders to see that our cars are distributed in the most equitable manner."

Auto manufacturers admit their efforts to curb the practice of packing new cars with accessories have made little headway. Privately, some manufacturers will even

- Continuous atmospheric control
- Precision heat regulation
- Low gas consumption

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Swindell Bottom Entry Malleable Furnaces, with specialized design and construction features, provide outstandingly efficient performance in malleable castings production. *May we have your inquiry?*

SWINDELL-DRESSLER *Corporation*

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH, PA.

admit that the factory may be partly responsible for the appearance on the car of some of the accessories which the customer did not order.

Auto manufacturers are becoming increasingly conscious of the fact that many car dealers are reluctant to take steps **now** to build up their sales organizations. The manufacturer's position is that a satisfactory sales organization is absolutely essential if the dealer is to be in position to compete when car deliveries catch up with the demand for new cars. The manufacturers are well aware that dealers' profits are continuing at all-time high levels and that many car producers have deliberately held down the number of dealers, thereby giving each dealer a higher quota of cars than he might otherwise have received.

Meanwhile, if a final punch at auto dealers was needed it was delivered by Recorder's Judge W. McKay Skillman of Detroit, in a sizzling 30-page report which was forwarded to Gov. Sigler. Based on the testimony of 750 witnesses, Judge Skillman found that some new car dealers in Detroit have secretly sold at much higher than list price "a large number" of new cars direct to used car dealers for direct sale to the public. According to Judge Skillman's findings, the dealers used "dummy names" to hide the sales and paid taxes only on the fictitious sale, not the true sale at the inflated price.

Judge Skillman charged that "certain, but not all" auto manufacturers could have speedily corrected the situation by canceling dealers' franchises. He also contended that laxity in Michigan's State Dept. of Revenue and the Secretary of State's office has contributed to the situation.

"The knowledge that conditions which I describe in this report existed in the automobile industry is almost universal," Judge Skillman said. "How the manufacturer, with his agents, auditors and investigators constantly working in the field, could have escaped knowing what the public knew well is difficult to understand."

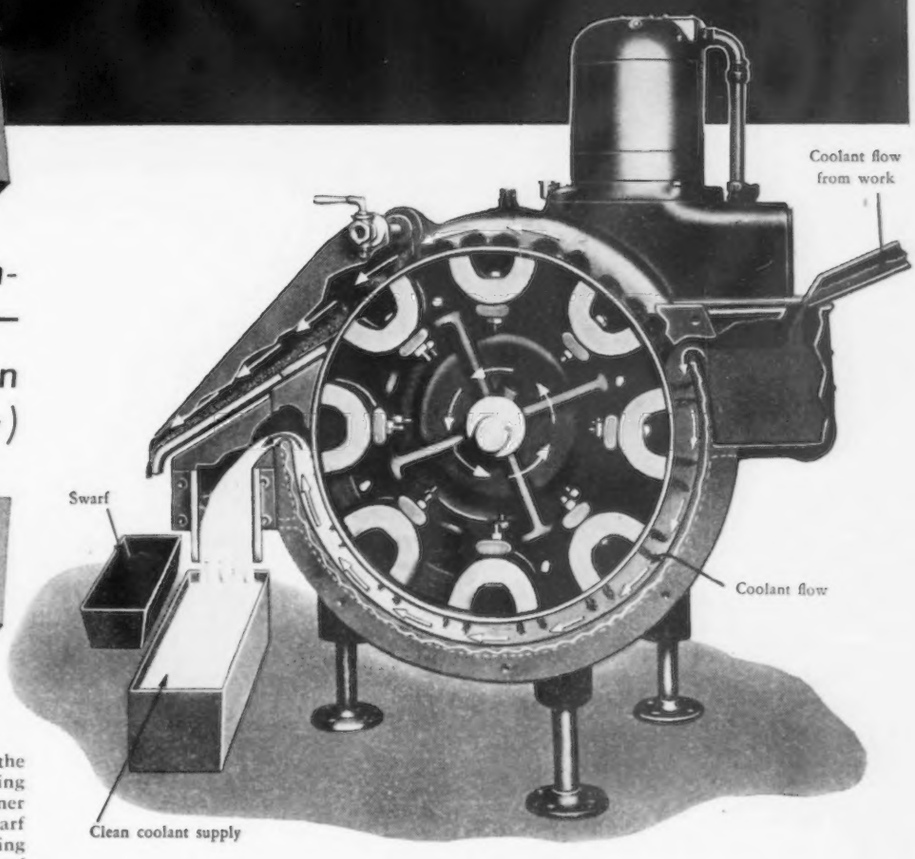
Following the report by Judge Skillman indictments charging irregularities in sales of new and used cars have been returned against nine Detroit auto dealers.

Cutting Oils Re-claimed Automatically...

with the help of...

ALNICO MAGNETS

(Aluminum-NICKEL—Cobalt—Iron Alloy)



BARNESDRIL AUTOMATIC MAGNETIC COOLANT SEPARATOR . . . pictured to show operation. Coolant from the work flows, as pictured, around a revolving drum that carries Alnico magnets on its inner face. On its outer face, the magnetic swarf fastens endwise over each magnet. Traveling with the drum toward a scraper, the swarf fine-combs most of the other entrained non-magnetic particles from the coolant. Standard sizes handle 5, 10, 20, 40 or 100 gal. per min.

Here's an open view of a separator that completely frees machine operators from the task of keeping coolants clean.

Fully automatic, this type reclaims as much as 100 gallons of oil per minute.

Developed and produced by Barnes Drill Co. of Rockford, Ill., the equipment incorporates a series of Alnico permanent magnets containing 20 per cent Nickel, which contribute fundamentally to the unique efficiency of this separator.

The exceptionally high magnetic properties of Alnico, an aluminum-Nickel-cobalt-iron alloy, permit designs that were technically impossible with older materials. Compared with the latter, Alnico reduces space and weight requirements to practical limits.

Nickel, an essential element in Alnico, also improves hundreds of other alloys for applications in the machine tool industry.

We invite consultation on the use of Nickel or Nickel alloys in your products or equipment.

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THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

Canadian Steel Production and Shipments

Toronto

• • • Canadian production of primary iron and steel shapes for the month of August totaled 234,601 net tons as compared with 228,844 tons in July and with 82,518 tons in August 1946. The big increase for August this year over that of 1946 is due to the fact that last year labor strikes closed entirely two of the three major steel mills in Canada and reduced operations of the Hamilton mills to less than 60 pct of capacity. Output for August included 233,707 tons of carbon steel shapes and 10,894 tons of alloy steel shapes. In the production figures for August are included 59,920 tons shipped to producers own plants or to other plants within the primary industry for further processing.

Shipments of primary iron and steel shapes in August amounted to 182,324 net tons of which 172,301 tons were carbon shapes and 10,023 tons alloy shapes; in July shipments totaled 167,494 tons including 159,285 tons of carbon and 8,213 tons of alloy shapes, and for August, 1946, when steel production was sharply reduced through strikes, shipments amounted to 65,824 tons including 62,060 tons of carbon and 3764 tons of alloy steel shapes. The above figures which show iron and steel shapes for sale do not include deliveries for further processing.

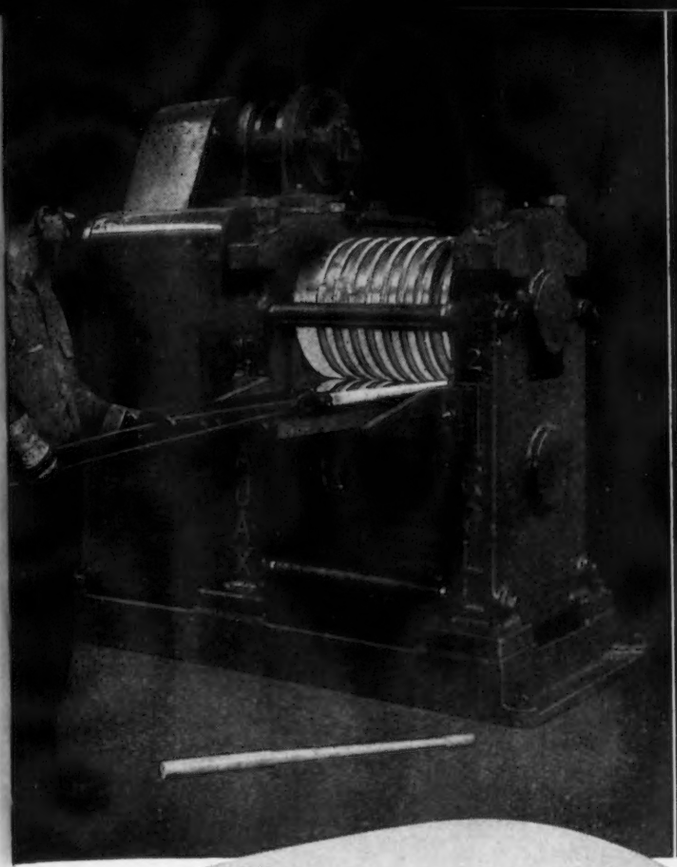
For the 8 months ending with August production of primary iron and steel shapes totaled 2,094,652 net tons, while shipments for sale amounted to 1,580,603 tons and deliveries for producers' interchange amounted to 524,174 tons. For the corresponding period of last year production totaled 1,661,790 tons, and shipments for sale 1,343,423 tons, and producers' interchange, 310,439 tons.

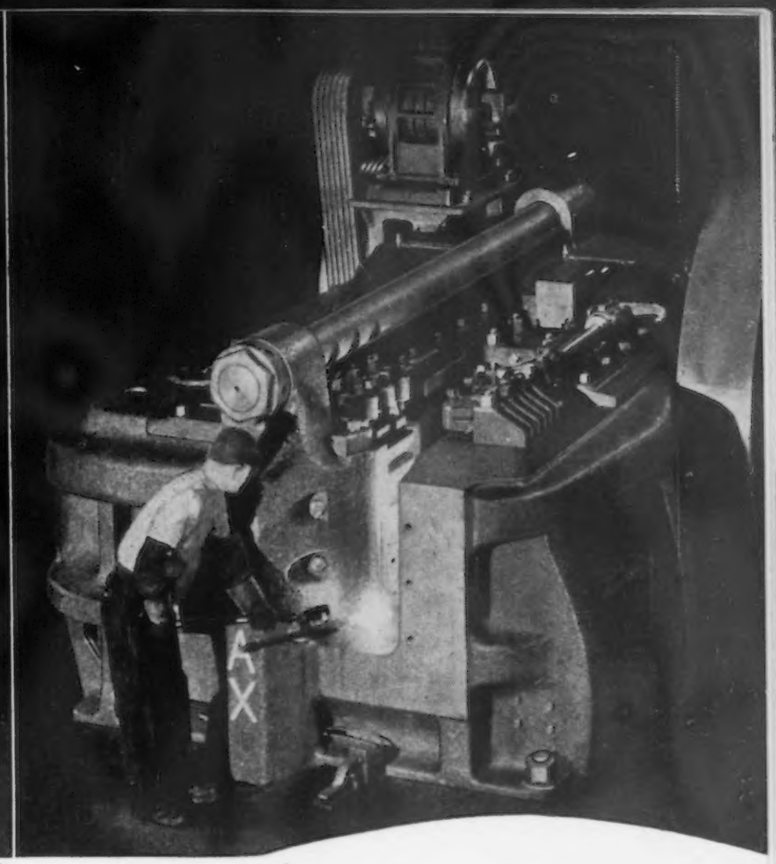
The following table shows production and shipments for sale of primary iron and steel shapes for the month of August in net tons:

August 1947	Carbon Steel		Alloy Steel	
	Made	Shipped	Made	Shipped
Billets, etc. for forging	6,674	4,200	668	788
Other semifinished shapes, not for rerolling by makers	28,021	7,141	606	.....
Structural shapes and piling	10,782	11,699	.....	.....
Plates	15,123	15,231	.....	.....
Rails	21,945	17,843	.....	.....
Tie plates and track material:				
Splice bars	495	610	.....	.....
Tie plates	3,239	2,976	.....	.....
Spikes	648	584	.....	.....
Tool steel	218	177	238	285
Concrete reinforcing bars	4,469	6,084	.....	.....
Hot-rolled bars for cold finishing	1,148	.....	.....	.....
Other hot-rolled bars	34,879	29,754	7,775	7,464
Pipes and tubes	7,688	9,003	.....	.....
Wire rods	20,604	13,715	8	7
Hot-rolled black sheets	22,738	14,891	.....	.....
Cold reduced black sheets	3,480	3,480	.....	.....
Galvanized sheets	6,459	6,825	.....	.....
Steel castings—by ingot makers	2,124	1,864	20	18
—by other foundries	4,107	3,990	1,354	1,290
All other shapes, including tin plate, tin mill, black plate cold finished bars and strips, etc.	38,868	22,234	225	171
TOTAL	233,707	172,301	10,894	10,023

Producers' shipments of primary iron and steel shapes subdivided according to principal consuming industries for the month of August, in net tons, follow:

Industry	Carbon Steel	Alloy Steel
Automotive industries	6,047	5,294
Agricultural, including farm machinery	7,617	82
Building construction	19,374	57
Containers industry	17,269	9
Machinery and tools	10,748	480
Merchant trade products	20,518	83
Mining, lumbering, etc.	8,024	741
National defense	83	5
Pressing, forming and stamping	10,640	45
Public works and utilities	534	79
Railway operating	19,409	253
Railway cars and locomotives	16,142	28
Shipbuilding	2,150	25
Miscellaneous and unclassified	953	146
Wholesalers and warehouses	22,044	313
Direct export—to British Empire	7,373	88
—to other countries	5,398	2,295
TOTAL SHIPPED FOR SALE	172,301	10,023
Producers' interchange	59,314	606





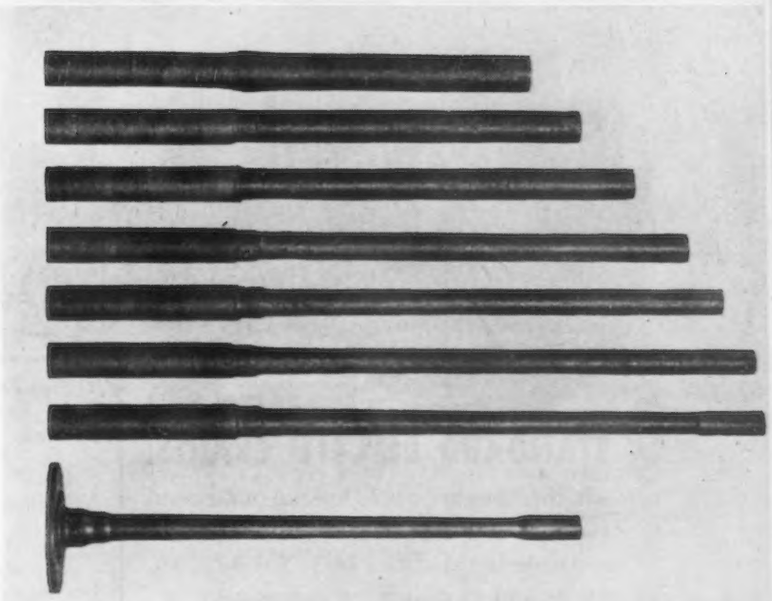
AJAX FORGING ROLLS Taper Rear Axle Shafts

Ready for Flanging on AJAX FORGING MACHINES

AJAX Forging Rolls are used extensively and advantageously in the forging of tapered automobile and truck rear axle drive shafts. The rolls form the tapered section between wheel seat and spline—accurate, smooth and free from seams or flash lines which would start fatigue failures. After straightening, no machining is done on this tapered section.

When called for, the tapered wheel seat can be rolled at the same heat. When a flange is required, the end is reheated and upset accurately and close to dimensions in an Ajax Forging Machine.

Write for Bulletin 91-A



Steps in Rolling a 16 Pound Flanged Axle Shaft

THE AJAX MANUFACTURING COMPANY

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DEWART BUILDING NEW LONDON, CONN.

Officers Elected At National Convention Of Tool and Die Men

Philadelphia

• • • **The National Tool** & Die Mfrs. Assn. held its second national convention at Philadelphia.

The following officers were elected for 1947-1948: President, William R. White, Jr., Midwestern Tool Co., Chicago; first vice-president, J. J. Kohl, International Tool Co., Dayton, Ohio; second vice-president, John H. Benetz, Bridge Tool & Die Works, Philadelphia; secretary, Centre W. Holmberg, August W. Holmberg & Co., Inc., New York; treasurer, Jerome Stanek, Stanek Tool & Mfg. Co., Milwaukee.

One of the highlights of the convention was a report, "Industry's Future in an Explosive World," prepared by Marshall M. Smith, president of the E. W. Bliss Co., Detroit, on his recent industrial tour of Great Britain, France and Belgium. Mr. Smith was unable to deliver his address in person because of illness and his report was presented by Ray H. Sullivan, vice-president in charge of manufacturing of the E. W. Bliss Co.

Mr. Smith urged, in his report, that the United States be careful of its timing in respect to any foreign lending program. "Continuation of the lending policies we have followed to date," Mr. Smith said, "can only serve to bolster the present socialist regimes and prolong their tenure of office and at the same time postpone sound reconstruction. In this international political game dollars are like dynamite. They can do us a lot of good if wisely used, and they can create a lot of trouble and future distress for us if not used with infinite skill."

William R. White, Jr.
President

Mr. Smith felt that the State Dept. "is our only hope" in meeting this difficult situation. He recommended that industry make known to the State Dept. its

views on matters with which it is competent to deal. "It is my belief," he said, "that the closer industrial leaders work with the government, the better our government will be and the better equipped our State Dept. will be to deal with these foreign situations which are so full of apprehension for all of us."

Mr. Sullivan, in his address following Mr. Smith's report, predicted a bright future for both the tool and die and pressed metal industries. He pointed out that the constantly increasing cost of labor and materials has been responsible for a large demand for automatic presses which has been responsible for a marked trend toward the use of progressive and compound dies.

Another feature of the program was a panel discussion on "Getting Best Results in Tooling," with two purchasers of tooling and two shop owners presenting their arguments.

Representing the customers were Samuel H. Paul, supervisor of tool purchases, Heintz Mfg. Co., Philadelphia; Ralph Allen, assistant superintendent, tool & plant maintenance div., Western Electric Co., Kearny, N. J. Representing the shop owners were Centre W. Holmberg, president, August W. Holmberg & Co., Inc., New York, and H. E. Ehrhardt, president, Norwood Engineering Co., Dayton.

The purchasers of tooling stressed that what manufacturers required from tool and die shops is a more complete understanding of what the manufacturer expects from the tools and dies he buys. The shop owners, in turn, recommended that the manufacturer acquaint the tool and die shop thoroughly with the use he intends making of these tools and dies and provide the shop with all available information regarding design and end-use.

J. J. Kohl
First Vice-President

Other highlights of the meetings were a paper, entitled "Realistic Methods of Estimating," by Richard F. Moore, president of

Moore Special Tool Co., Inc., Bridgeport, and chairman of the National Tool & Die Mfrs. Assn.'s Business Management Committee. A. R. Gieringer, president of the A. R. Gieringer Tool Corp., Milwaukee, was the discussion leader.

"What the Taft-Hartley Act Means to You," was the subject of a report presented by Eugene B. Schwartz of Stanley & Smoyer, Cleveland labor relations attorneys.

William F. Patterson, director of the U. S. Apprentice Training Service, Washington, spoke on "Training Tool Makers." He praised the efforts of the association in helping to alleviate the shortage of skilled tool and die makers by their apprenticeship training programs.

It was the opinion among the delegates that tooling for new models of all products is now beginning to come out in full force and the tool and die industry will be "extremely busy for the next 3 to 5 years."

Industrial Building Slumps, But Housing Construction Gains

Washington

• • • **Although industrial** construction showed a slight drop in October, residential building was up 3 pct for the month and 44 pct above last year, thereby increasing prospects that the construction goal of $12.5 billion for 1947 may be realized.

The cumulative total for the first ten months of 1947 is placed by the Dept. of Commerce at $10.2 billion as against $7.9 billion for last year; new building in October was estimated at $1.2 billion, compared with slightly more than $1 billion last year.

Industrial construction was off one percent for October and 19 pct below October 1946; total industrial building to date amounts to $1.4 billion for the year. While a slackening is indicated, this still represents a 6 pct gain over last year.

Residential building, exclusive of rural construction, amounted to $510 billion for October and to $3.9 billion for the year. Some $2.8 billion was effected during the same period last year.

Describes Greater Wealth Through Higher Production

Boston

• • • **The American** Society of Tool Engineers held its 15th semi-annual convention at Boston at which time a series of papers more on the practical than on the technical phases of tooling were given. Some of the sessions were extremely commercial, being conducted exclusively by supplier companies, but new tooling developments and techniques as well as new products were described.

Clayton R. Burt

The highlight of the three day meeting was the banquet at which Clayton R. Burt, chairman of the board, Niles-Bement-Pond Co., West Hartford, Conn., discussed "Machine Tools and the Tool Engineer —The Backbone of American Industry." Mr. Burt described several war jobs that caused considerable trouble in his company and how the tool engineers worked out solutions to these problems.

"Before production, achieved through machine tools, can yield its accompanying greater wealth and a higher degree of living comfort, management and labor must get together and stop strikes, slowdowns, and senseless bickering," he said. "Too often management has failed to recognize and encourage the individual worker, regarding him as a cog in the wheel. On the other hand, too many workers have failed to turn in an honest day's work, yet expect top wages for only indifferent skill and loyalty."

"The only way to earn more is to produce more. Increased production is the answer to a big majority of individual troubles and is the only sure way to reduce high living costs. More than 60 million people are employed today with an estimated $6000 to $8000 invested in machines and tools per person. The average profit per sales dollar

is only 6 cents, of which half must be earmarked for new equipment and the other half for dividends to stockholders who own the factory buildings and tools."

In the technical discussion group on "A New Concept in the Field of Abrasive—32 Alundum," three representatives of the Norton Co., Worcester, Mass., described the production and the applications of this new alpha alumina abrasive material. W. T. Montague, vice-president of Norton, told of the efforts of the Grinding Wheel Association with regard to the use of abrasives, and then introduced A. A. Klein, assistant director of research, and G. T. Rideout, sales manager.

Default of Low Bidder Costs Bond of $100,000

Philadelphia

• • • **A default of the** low bidder on the Penrose Ferry bridge over the Schuylkill River was reported here last week when the Pennsylvania Highway Dept. rejected bids on the project. Foley Bros., Inc., Pleasantville, N. Y., had submitted a combined bid of $5,133,857.51 for grading, piers and abutments on both sides of the river. Since the Foley bid was nearly $1 million lower than separate low bids from other contractors for work on a single side of the river, the contract was awarded it.

The contractor forfeits a $100,000 bond submitted with the bid. The action was due to an error by the contractor in the calculation of his costs.

E. L. Schmidt, chief engineer, gave assurance that the state would proceed at once to re-advertise for new bids. It was indicated the new proposals would be received Nov. 21.

The Kaufman Construction Co., Philadelphia, was the low bidder for the work on the west side of the river with a price of $2,193,521.78 and Francis A. Canuso and Son, Philadelphia, submitted the low offer of $3,854,762.23 for the east side construction.

Defends Industry's Program to Relieve Shortage of Steel

Detroit

• • • **More than a thousand** persons heard Ernest T. Weir, chairman of National Steel Corp., defend the steel industry's current program to relieve steel shortages at a joint meeting of the Engineering Society of Detroit and the Detroit Section of the American Society of Mechanical Engineers in Rackham Educational Memorial Auditorium.

"Although the steel industry is accused of holding down production and of failing to expand capacity," Mr. Weir said, "the facts are that 1947 will be the biggest year of peacetime steel production and the industry is now carrying on the greatest expansion program in its history at a cost of more than $1 billion."

Mr. Weir said there is at present a double demand for steel which is caused by attempts to fill the need for goods that accumulated during the war and at the same time build inventories in industrial plants which are turning out the greatest volume of products in their history.

"The demand for inventory building is entirely abnormal and will disappear as soon as the pipelines are filled. This has already happened with some steel products."

Strikes and slowdowns since the war, which have cost 18 million tons of ingot steel and a loss of more than 18 million tons of scrap which were exported (mostly to Japan) from 1935 to 1941, were cited as factors which have greatly limited the production of steel in this country. Mr. Weir predicted that if a direct increase of from 10 to 20 pct in steel capacity were attempted, it would deprive current steel users of four tons of steel for every 10 tons of additional steel capacity. He estimated that 3 million tons of new ingot making capacity will be brought into production in 1947 and 1948.

National Steel Corp., Mr. Weir said, has a program under way to increase ingot capacity by 800,000 tons within the next two years.

The cost of this program is approximately $100 million.

During the next two months Great Lakes Steel Corp. will place in production new facilities which will provide 300,000 tons of new capacity. The remaining 500,000 tons will come largely from the use of oxygen that will be provided by plants built at Weirton next year and at Great Lakes the following year.

National Steel Corp. will use oxygen first in the blast furnaces and facilities will be available to apply oxygen in Bessemer and openhearth operations where it has been used experimentally for nearly two years with great success, Mr. Weir said.

An ultimate increase in production of more than 20 pct with the use of oxygen is anticipated by National Steel.

In defense of recent increases in the price of steel, steel executives asserted that the cost of steel-making in 1947 is 70 pct greater than prewar while steel prices are only 38 pct higher than prewar. Average profits in the steel industry for 1939, 1940 and 1941 were 6.73 pct of sales. During the first six months of 1947 profits were at a rate of 6.66 pct of sales, according to Mr. Weir.

The United States should "go slow" in its foreign aid program, Mr. Weir warned. European countries, he said, are not doing enough to help themselves. United States should grant funds for aid only on the basis of the most thorough investigation and total aid should be held within the practical limits of this country's resources and abilities, he advised.

Seeks Pipe Line Permit

Boston

• • • **Tennessee Gas Transmission** Co. has filed an application with the Federal Power Commission for authority to construct and operate a natural gas pipe line into New England.

The Massachusetts Public Utilities Commission has indicated that it will seek permission to intervene in the proceedings when set down for hearing by FPC. Such action would be taken in the interest of the investment of more than $140 million in the Massachusetts gas industry.

FEATURE CONTINUATION

Carbide, Nitrides And Porosity in Aluminum

(CONTINUED FROM PAGE 78)

The overall effect of these active nongaseous inclusions is far out of proportion to their solid volume. The mechanical disadvantages of solid inclusions, which become gas formers under conditions of elevated temperatures in the presence of water, as commonly encountered in mill, foundry and machine shop practices, are far more pertinent to the ultimate quality of aluminum products than the effects of precipitated hydrogen.

Control of carbide contamination is a much more difficult problem to solve than the control of hydrogen. If hydrogen were the chief source of gas contamination, the metallurgy of aluminum would actually be relatively simple.

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Special Report

(CONCLUDED FROM PAGE 119)

niques, steel producers explain, the automobile, washing machine, refrigerator and similar industries could not have grown as they have. If the concentration had been on improving pack rolling technique the price of the thinner gage hot-rolled sheet might be a little lower today. But, it is asserted, the economics of the steel production and supply picture dictated no such trend.

The result is that those fabricators who could profitably use light gage hot-rolled sheets have seen their supply sources disappearing. Today there are few hand mills selling their carbon steel sheets on the open market. And barring certain unusual or local conditions, low carbon hot-rolled sheet can never again, it is said, be produced in thin gages in competition with cold-rolled sheet.

MACHINE TOOLS

. . . News and Market Activities

Machine Tool Prospects Appear Bright for Fourth Quarter

• • • **At least one** of the pivotal companies in the machine tool industry is on record that October proved to be their best month of the year to date, and indications are that November will be as good, if not better, which should make the fourth quarter the best quarter of the year.

This producer reported that business during the first half of November, plus the October upsurge, is equivalent in volume to 75 pct of the best of the first three quarters. This makes everything they get in December strictly gravy.

Throughout the industry there are lots of inquiries still to be closed, and while last week's order sheets were not loaded in every case, November looks very strong for most of the machine tool industry.

Although interest in government-owned surplus machines has been dissipated to some extent by the JANMAT freeze and the 1947 Machine Tool Show, there is a considerable amount of rebuilding going on by machine tool builders and qualified dealers. A number of customers are sending machines back to the factories for either extensive repair or complete rebuilding, and some builders are rebuilding machines for resale which were purchased from surplus.

While the general order pattern indicates that customers are in a mood to talk business, the machine tool market is not bullish in every sector. A lathe producer is laying off men, and will probably continue to do so until the first of the year. It may be that the rich are getting richer and the others are not getting enough orders.

Francis J. Trecker has been named president, Kearney & Trecker Corp., and Edgar W. Trecker has been appointed executive vice-president. E. J. Trecker was formerly secretary of K-T and E. W. Trecker was formerly vice-president in charge of manufacturing.

In Spite of Bright Outlook Not All Sectors Report Market Is Bullish

o o o

In Detroit, the interest of buyers of special machines for high production continues unabated, although actual purchases of tool room equipment, so-called, and standard machines appear to be at very low volume. A bright spot in the picture is the reported interest of small shops in comparatively large equipment. While no large tooling programs have been reported during the past week, there are indications that at least a part of the Chrysler program has been released.

Interest here appears to center in transfer-type machines. Several large installations, it is reported, have been delivered during the past ten days. Some tool and die equipment is moving. The interest stimulated by the Machine Tool show continues to be in evidence, although most sources agree it will be difficult to evaluate the long-time results of the Chicago showing for several months yet.

Informed sources report that the tooling program for the new Olds V-type engine, the first of the GM V-engines, is now well under way. Indications are that production of the new type engines may start as early as May of next year.

In the East, inquiries for new tools have improved tremendously during the past week, but dealers are uncertain whether this prospective business represents the possibility of immediate purchase or is based on the accumulation of price information on which to base next year's appropriations. In analyzing the volume of October business, some dealers find that their orders during that month were sufficient to permit them to break even, compared with September's volume, which was not sufficient to carry their overhead.

Sellers for export report that there has been no improvement in the volume of orders from abroad. The import restrictions established by most of the Latin American countries are still in effect and there is little immediate prospect of lifting them.

In some sectors of the East machine tool builders admit disappointment over business. While much interest apparently was aroused at the Chicago show and quotations were made as a result, industrial interest has evaporated into thin air. In those cases where first follow-up quotations were made and prospects seemed interested, sellers are now told nothing will be bought until after Jan. 1, if then.

A couple of Worcester tool makers have been advertising for certain types of operators, but they are rare exceptions. A Springfield tool maker has laid off some employees.

•

MARKET CHIPS . . . Trade circles are buzzing about an order from Argentina for 300 lathes, which is supposed to have gone to an eastern builder, but more than likely has been given to the Italians, who are offering fair equipment at easy terms and low prices; the turret lathe order went to Ward, Great Britain, according to reports. . . . Kaiser-Frazer has been getting some tools from War Assets Administration or JANMAT, apparently under the agreement that the government can call for them in time of national emergency. . . . Tool and die shops in the Detroit area are optimistic about 1948 if want-ads for help in the Detroit papers can be taken as any indication. . . . Machine tool builders have been working on heavy backlogs, and while business is generally holding up, there is not enough to operate the machine tool plants on anything like a wartime basis; therefore, layoffs now and then are in order.

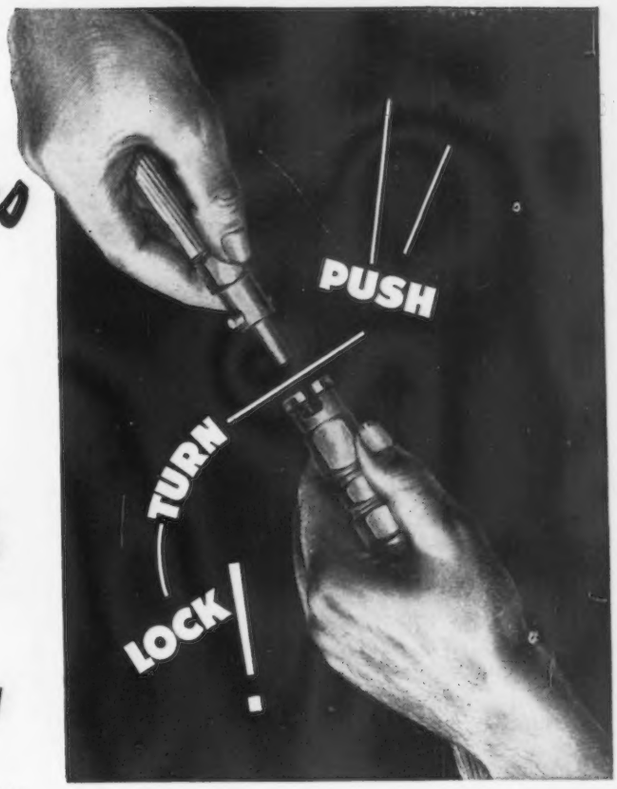
For the Finest Finishes

depend on

DEVILBISS

EQUIPMENT

. . . down to the last detail



Equip your air and fluid hose with the proper DeVilbiss Connections and profit from the savings in labor, reduced waste from leakage and lower replacement costs.

DeVilbiss Quick Detachable Connections permit a single air line to serve many functions with maximum efficiency. The customary tangle of numerous air lines is eliminated and many spray guns and air tools can be served from a single air line. A twist of the wrist "CLICK" and air tools go into action. No screwing nuts on and off—no shutting off air lines—no crimping air hose to make a slow connection—no premature hose failure due to pinching. DeVilbiss Quick-Detachable Connections are adaptable to the air inlet of the tool as well as to air supply take-off points.

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Like every item of equipment in the complete DeVilbiss line, *DeVilbiss Connections are built better* to provide finishes of finest quality. Consult your DeVilbiss engineer for advice on your hose connection problems and for expert help on all your equipment requirements.

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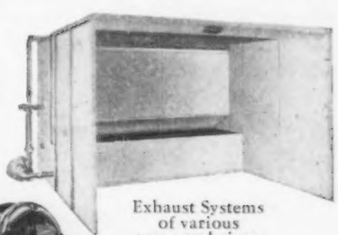
Spray Equipment for every finishing requirement.



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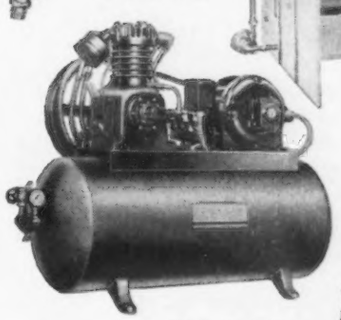

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Air Hose, Fluid Hose, and Connections for long useful service.

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means Quality *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

NONFERROUS METALS

. . . News and Market Activities

Lead

• • • **The lead market** continues in short supply with customers unable to obtain their full requirements from producers. The government stockpile would not be much help as when last reported it amounted to only some 4000 tons. It is expected that the current market may be expected to continue into the first quarter. Domestic and secondary production are running at about 30,000 tons per month each, the balance of the approximately 80,000 tons consumption is made up of imports of metal and ore. Government purchases for the permanent stockpile were able to take up the unrequired tonnage during the slack summer months. Apparently, however, the government has been unable to obtain metal in tonnages sufficient to meet its stockpile objectives and the industry has been studying the effect on the market of a more dynamic procurement program. This speculation has been set off by the tenor of Secretary Krug's remarks at the El Paso meeting of the American Mining Congress.

•

Zinc

• • • **According to some** producers Special High Grade has become the grade in tightest supply, although Prime Western continues in short supply. Consumers are able to obtain their zinc requirements, however, although it may require some digging to find either of these grades. The threat to the market represented by Japanese zinc tonnages has been dissipated by purchases for domestic needs or export.

Cadmium

• • • **Cadmium is being** bought for the permanent stockpile and is being exported. It is therefore not too plentiful although consumers are reported to be able to obtain their requirements. Market factors report that there is no longer a gray market for domestic consumers but that because of the higher export price there are indications that there may be an export gray market operating.

•

Zinc Plant Will Close

Pittsburgh

• • • **American Zinc** & Chemical Co. is closing the Langeloth, Pa., plant which it started in 1913. The plant has been manufacturing zinc and sulfuric acid largely for sale to the metalworking industry. Zinc production will cease at the end of November and the entire plant is expected to be closed by Feb. 1, according to a company spokesman.

•

Ingot Aluminum Prices Up

New York

• • • **Following up** price increases of ¼¢ per lb in some copper bearing aluminum grades a week ago, ingot producers made further increases of ½¢ per lb last week. Increases in steel deoxidizing grades of aluminum were increased last week by ¼¢ to ½¢ per lb, likewise following up increases made a week ago.

This price development is caused, according to market observers, by the higher prices now being paid by primary smelters for segregated scrap, principally 2S, because they are unable to obtain sufficient tonnages of primary pig to take care of their requirements. There has been an increase of about ½¢ per lb in segregated scrap. However, miscellaneous scrap grades have not increased in price and there is plenty of such scrap available. Competition for scrap by primary smelters is an unusual condition and is making necessary the increases in aluminum ingot prices.

Demand for ingots is reported to have increased, due to the adjustment of inventories since the summer lull, coupled with increasing shortages in steel and other nonferrous metals.

•

Eagle Enters New Field

Cincinnati

• • • **The Eagle-Picher** Co., lead and zinc producers and fabricators, announced this week that it was entering a new field with the completion of a plant at Clark, Nev., to produce diatomaceous earth. T. C. Carter, vice-president, said the material came from the fossilized remains of a microscopic plant, is light and porous and has high absorptive qualities.

•

New French Metal Prices

Paris

• • • **The French Government** has announced new prices for nonferrous metals in an order dated Oct. 25. Prices of zinc, lead and antimony have been increased by the action, but copper prices have been lowered. British tin remains unchanged. Base prices shown are in francs per metric ton. Circulation tax of 10 pct and transaction tax are not included. Prices are f.o.t. producer's works or port of entry.

	Price in Francs	
	Former	*New*
Copper wire bars	68,000	64,000
Copper cathodes	67,320	63,360
Refined copper, 99.9%	66,980	63,040
British tin, 99.9%	216,000	216,000
Lead, soft, 99.9%	42,000	58,000
Zinc, virgin, 97.75%	31,000	40,000
Zinc, electrolytic, 99.95%	32,500	41,800
Antimony, 99%	95,000	130,000
Magnesium ingots, per kg	110.20	115.70

Nonferrous Metals Prices

Cents per pound

	Nov. 12	Nov. 13	Nov. 14	Nov. 15	Nov. 17	Nov. 18
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$35.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$80 to $90
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$81 to $83
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$62 to $65
Silver, New York, cents per oz.	74.625
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.06
Zirconium copper, 6 pct Zr. per lb contained Zr.	$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No 115	17.50-18.00
No. 120	17.00-17.50
No. 123	16.50-17.00
80-10-10 ingot	
No. 305	21.50-22.00
No. 215	19.50-20.00
88-10-2 ingot	
No. 210	27.25-27.75
No. 215	25.75-26.25
No. 245	19.75-20.25
Yellow ingot	
No. 405	13.75-14.50
Manganese Bronze	
No. 421	15.75-16.50

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	15.75
0.60 copper, max.	15.50
Piston alloys (No. 122 type)	15.00
No. 12 alum. (No. 2 grade)	14.50
108 alloy	14.75
195 alloy	14.50
AXS-679	15.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-95½ pct.	15.00
Grade 2—92 pct-95 pct.	14.00
Grade 3—90 pct-92 pct.	12.75
Grade 4—85 pct-90 Pct.	12.25

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37⅝
Electrodeposited	32.34
Rolled, oval, straight, delivered	32.59
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33¾
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz. lots, per troy oz.	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	43.00
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz.	54.00
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall; 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75-S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness; 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam. rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢ 10,000 lb base, B & S gage 00-1, 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢ 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

(Cents per pound, f.o.b. mill effective June 11)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc.	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	14½
Loose yellow brass trimmings	15½

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire	15½—16
No. 2 heavy copper and wire	14½—15
Light copper	13 —13½
Auto radiators (unsweated)	8¼— 8¾
No. 1 composition	11 —11½
No. 1 composition turnings	10½—11
Clean red car boxes	9 — 9¾
Cocks and faucets	8¾— 9¼
Mixed heavy yellow brass	6½— 7
Old rolled brass	7 — 7½
Brass pipe	8¼— 8¾
New soft brass clippings	11 —11½
Brass rod ends	8½— 9
No. 1 brass rod turnings	8 — 8½

Aluminum

Alum. pistons with struts	3½— 4
Aluminum crankcases	5½— 6
2S aluminum clippings	8½— 9
Old sheet & utensils	5½— 6
Mixed borings and turnings	— 2
Misc. cast aluminum	5 — 5½
Dural clips (24S)	4½— 5

Zinc

New zinc clippings	5½— 6
Old zinc	4¼— 4½
Zinc routings	2½— 3
Old die cast scrap	2½— 3

Nickel and Monel

Pure nickel clippings	15½—17½
Clean nickel turnings	14 —15
Nickel anodes	16 —17
Nickel rod ends	16 —17
New Monel clippings	12 —13
Clean Monel turnings	7 — 8
Old sheet Monel	10 —10½
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	7½— 8
Nickel silver turnings, mixed	5½— 6

Lead

Soft scrap lead	10¾—11¼
Battery plates (dry)	5 — 5½

Magnesium Alloys

Segregated solids	6½— 7
Castings	4½— 5½

Miscellaneous

Block tin	63 —65
No. 1 pewter	48 —50
No. 1 auto babbitt	38 —40
Mixed common babbitt	11½—12
Solder joints	13 —13½
Siphon tops	38 —39
Small foundry type	13 —13½
Monotype	12 —12½
Lino and stereotype	11½—12
Electrotype	9½—10
New type shell cuttings	11 —11½
Clean hand picked type shells	4½— 5
Lino and stereo dross	5 — 5½
Electro dross	3 — 3¼

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect Freight equalized with nearest free delivery point.

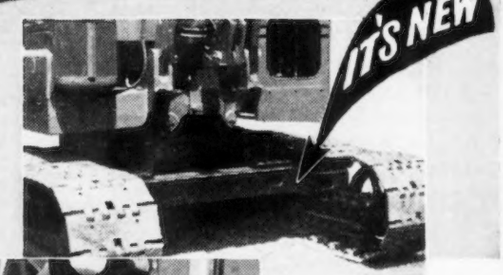
Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

Here's a Crane that's Tailor Made for Handling SCRAP!

Special Axle:
New type axle has been increased in width and height. Multiple-hinged shoes have been increased in width from 20" to 24". The new UNIT 1020A now has equal stability over both sides and ends. Handles a 45" Magnet with ease.

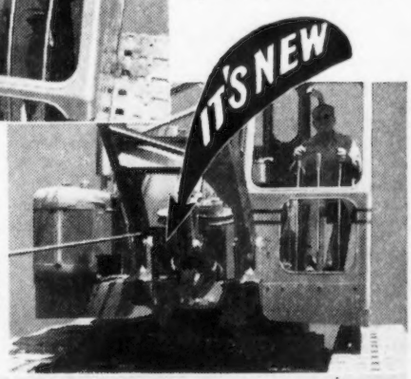
THE NEWLY DESIGNED UNIT 1020A

With All the Features You Need . . . or Ever Will Need!



- Pendant Boom Suspension . . . boom length can be altered without re-reeving boom hoist cable.
- Throttle Lever is within easy reach of operator . . . positive power and speed control at all times.
- Heavier, air-cooled Double Disc Clutches . . . for smooth performance and easy operation.
- Improved Automatic Traction Brakes with sectional linings which are easily replaced without removing shaft from machine.
- New leak-proof Oil Seals . . . keeps lubricants in . . . and dirt and abrasives out.
- New style foot brakes with self-aligning bearings on brake operating shafts. Wider, self-equalizing brake bands which eliminate dragging or scoring.

Swing Lock Control:
Hand operated swing lock control within easy reach of operator . . . no more stooping, kicking, or leaving cab for this operation.



New Type Magnet Fairlead:
This elevated Fairlead is especially adapted for magnet operation. It equalizes cable contact on two sheaves instead of one, minimizes unnecessary wear.

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SCRAP

Covering on Old Orders Strengthens Market

New York

• • • **The new trend,** if any, in the scrap market was not discernible this week. The testing period is still going on as consumers frantically try to stem any attempt of the market to start upward again. Some attempt will be made to buy on a basis somewhat similar to the old OPA methods roughly plus about $20. Whether or not this will meet success remains to be seen. It will be at least a week before the wholesale cancellation of old orders will put the dealers and brokers on the pan when it comes to making fresh sales.

This week there has been a mad scramble by brokers to cover old orders and since broker buying is the only activity present the market is appraised at a slightly higher level. Some brokers are paying more than they did last week to cover old orders. Next week will come the test of the much lower prices which have been suggested by many consumers of scrap. It is repeated that these are suggestions and there is no way of knowing this week whether such suggestions will have any more force than wishful thinking.

One thing appears to be certain —the market itself is not confused; it goes along merely following the law of supply and demand. Obviously if enough buyers stay out of the market long enough the price will go down. But if they all come in again en masse as they have in the past it will go up. That appears to be the simple basic action of the market for the past two years even though some interests seem to see something more complicated in the picture.

Cast grades continued their strength this week, and foundries continued to make inroads in some localities into steelmaking scrap supplies. Among the steel mills, the smaller units appear to be in relatively worse position for scrap supplies than are the larger units.

THE IRON AGE scrap composite price this week went down $.25 per ton, on the basis of a decrease of $1 in the top Chicago price. No changes were registered in Pittsburgh or Philadelphia.

•

PITTSBURGH—There has been no price activity in the delivered openhearth steel market during the past week. Some brokers have been paying a bit more to cover on the orders which run out this Saturday. While railroads hold down their heavy melting sales by allocation, the prices of scrap rails and specialties are soaring sharply. No. 1 cast is up another $2 this week. When the price testing period comes with the end of higher priced orders in this district all eyes will be on the smaller mills. How long some of them with relatively low stockpiles can hold out for a $40 price is a question in the trade. A return to a buying system something like that used during OPA days is proposed here as one means of stabilizing the wild gyrations of this postwar scrap market.

•

CHICAGO—The Nov. 22 deadline by which the high priced orders must be completely shipped caused considerable activity here. Broker prices to cover the unshipped orders varied widely depending on each individual position. The mills have accepted railroad heavy melting and will continue to take it for 30 days. At the moment the trade is taking the $39 top mill price very seriously. The springboard prices, as now suggested by several mills, call for a ceiling of $22 a gross ton shipping point for eight western states and $30 minimum for all other states.

The market at best represents a period of appraisal by both buyer and seller alike. Whether the line can be held remains to be seen but the rules for springboard operation have caused extreme confusion. Last week's cast iron car wheels price reported as $55.50 to $56.50. Should have read $45.50 to $46.50.

•

PHILADELPHIA—The heavy melting market remained firm last week with new sales at the quoted level. All factors agree that the tonnage involved is insignificant. Brokers were reported to have paid $43 to cover orders last week. Some broker purchases have been made this week at $42.50. The Reading Co. sold heavy melting at $45.60, specialties $49.10 to $49.60, and malleable $59.69. Reports indicate that some brokers are buying for local mills in Jersey City and New York. Shoveling turnings sold last week at $35.

•

CLEVELAND—Demand for the specialty grades is very, very strong, and the price of some items, particularly No. 1 cast, is just about whatever the seller can get. There has been little activity in the openhearth grades, and shipments have dwindled considerably since last week, when they were at low ebb. Much awaits action of some of the major consumers, set for this weekend, and the pyrotechnics which will doubtless follow.

•

DETROIT—Shipments against higher priced orders are continuing here at least until Nov. 22, and some tonnage, it is reported, is being moved at the present lower prices. Several scrap buyers report, however, that it is next to impossible to obtain scrap at these lower prices. In the meantime, a weakness is indicated in the market for turnings as some of the principal local buyers have withdrawn from this market. Cast grades continue strong, with prices as high as $50 being reported for some grades.

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BUFFALO—The market marked time again last week. Major consumers and local dealers appeared no nearer to doing business and no showdown was expected until near the end of the month. Cast scrap was very tight with one broker reported bidding $5 over the market for large tonnages. On the other hand small industrial malleable eased $5 to $45-$47.

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NEW YORK—A strong undertone in the market here for the past two weeks was attributed to the anxiety of brokers to cover old high priced orders before Nov. 22, when they are subject to cancellation. There was general uneasiness over the possible effects of the foreign aid program on the domestic supply at midweek.

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BOSTON—Brokers apparently are just as confused about values as a week ago. Offers with strings have been made to yards, these fluctuating from day to day, the evident idea being to establish prices at which business can be transacted. On the surface the market looks a little firmer, but not enough heavy steel is moving to really establish prices. Turnings and borings are moderately active.

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BIRMINGHAM — Although the price testing period had yet to arrive at the beginning of the week, the undertone here is for a much stronger market. There is virtually no trading in open hearth grades as dealers hold out against a $35 offer. Some cast is moving, and in the face of terrific demand and very limited supplies, each foundry just about sets its own price for that type of material.

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TORONTO — Demand for scrap iron and steel continues well in excess of supply in the Canadian markets and improvement appears unlikely under existing price ceilings. Some large tonnages have been listed on imports recently and the big steel makers are depending on these to carry them through the winter months, although with U. S. prices almost double those prevailing in Canada it is not expected that any large quantities will be obtained from across the line

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. Where substantial tonnages of open hearth grades come into a consuming district from outside of that district, the upper range of the price quoted here is the representative average delivered price of the bulk of this incoming material; the lower range shows the price being paid for scrap originating within the consuming district.

PITTSBURGH

Per gross ton delivered to consumer†:

No. 1 hvy. melting	$40.00 to $45.00
RR. hvy. melting	40.50 to 41.00
No. 2 hvy. melting	40.00 to 45.00
RR. scrap rails	49.00 to 50.00
Rails 2 ft. and under	53.00 to 54.00
No. 1 comp'd bundles	40.00 to 45.00
Hand bdld. new shts.	40.00 to 45.00
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.00 to 35.50
Shoveling turn.	36.50 to 37.00
Mixed bor. and turn.	35.00 to 35.50
Cast iron borings	35.50 to 36.00
No. 1 cupola cast.	51.00 to 52.00
Hvy. breakable cast.	40.00 to 40.50
Malleable	57.00 to 58.00
RR. knuck, and coup.	52.00 to 53.00
RR. coil springs	52.00 to 53.00
RR. leaf springs	52.00 to 53.00
Rolled steel wheels	52.00 to 53.00
Low phos.	48.00 to 49.00

†See box on this page.

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.00
No. 2 hvy. melting	38.50 to 39.00
No. 1 bundles	38.50 to 39.00
No. 2 dealers' bundles	38.50 to 39.00
Bundled mach. shop turn.	38.50 to 39.00
Galv. bundles	36.50 to 37.00
Mach. shop turn.	33.50 to 34.00
Short shov. turn.	35.50 to 36.00
Cast iron borings	34.50 to 35.00
Mix. borings & turn.	33.50 to 34.00
Low phos, hvy. forge	44.00 to 48.00
Low phos, plates	41.50 to 45.00
No. 1 RR. hvy. melt.	45.00 to 46.00
Rerolling rails	59.00 to 60.00
Miscellaneous rails	50.00 to 51.00
Angles & splice bars	50.00 to 51.00
Locomotive tires, cut	49.00 to 50.00
Cut bolster & side frames	48.00 to 48.50
Standard stl. car axles	55.00 to 56.00
No. 3 steel wheels	49.00 to 50.00
Couplers & Knuckles	48.00 to 50.00
Rails 2 ft. and under	55.00 to 56.00
Malleable	65.00 to 66.00
No. 1 mach. cast.	53.00 to 54.00
No. 1 agricul. cast.	49.00 to 50.00
Hvy. breakable cast.	41.00 to 43.00
RR. grate bars	47.00 to 48.00
Cast iron brake shoes	48.00 to 49.00
Cast iron carwheels	45.50 to 46.50

CINCINNATI

Per gross ton delivered to consumer.

No. 1 hvy. melting	$38.00 to $40.00
No. 2 hvy. melting	38.00 to 40.00
No. 1 bundles	38.00 to 40.00
No. 2 bundles	38.00 to 40.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	33.00 to 34.00
Cast iron borings	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Low phos. plate	49.00 to 50.00
No. 1 cupola cast.	51.00 to 53.00
Hvy. breakable cast.	42.00 to 43.00
Scrap rails	47.00 to 48.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy melting	$35.00 to $36.00
No. 2 hvy. melting	35.00 to 36.00
Nos. 1 and 2 bundles	35.00 to 36.00
Busheling	35.00 to 36.00
Shoveling turn.	31.50 to 32.00
Machine shop turn.	29.00 to 30.00
Mixed bor. & turn.	29.00 to 30.00
Cl'n cast. chem. bor.	33.00 to 34.00
No. 1 machinery cast.	44.00 to 45.00
No. 2 machinery cast.	44.00 to 45.00
Heavy breakable cast.	40.00 to 41.00
Stove plate	39.00 to 40.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.75 to $35.25
No. 2 hvy. melting	34.75 to 35.25
No. 1 bundles	34.75 to 35.25
New busheling	34.75 to 35.25
Flashings	34.75 to 35.25
Mach. shop turn.	29.00 to 29.50
Shoveling turn.	30.00 to 30.50
Cast iron borings	30.00 to 30.50
Mixed bor. & turn.	30.00 to 30.50
Low phos. plate	41.75 to 42.25
No. 1 cupola cast.	46.00 to 47.00
Hvy. breakable cast.	40.00 to 41.00
Stove plate	37.00 to 38.00
Automotive cast.	46.00 to 47.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	42.00 to 43.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	34.00 to 35.00
Mixed bor. & turn.	33.00 to 34.00
Clean cast chemical bor.	39.00 to 41.00
No. 1 machinery cast.	52.00 to 54.00
No. 1 mixed yard cast.	49.00 to 50.00
Hvy. breakable cast.	48.00 to 49.00
Clean auto cast.	52.00 to 54.00
Hvy. axle forge turn.	42.00 to 43.00
Low phos. plate	47.00 to 48.00
Low phos. punchings	47.00 to 48.00
Low phos. bundles	46.00 to 47.00
RR. steel wheels	49.00 to 50.00
RR. coil springs	49.00 to 50.00
RR. malleable	60.00 to 65.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.50 to $41.00
No. 2 hvy. melting	38.00 to 39.00
Bundled sheets	38.00 to 39.00
Mach. shop turn.	32.00 to 33.00
Locomotive tires, uncut	45.00 to 46.00
Mis. std. sec. rails	48.00 to 49.00
Rerolling rails	55.00 to 56.00
Steel angle bars	47.00 to 48.00
Rails 3 ft. and under	51.00 to 52.00
RR. steel springs	46.00 to 47.00
Steel car axles	46.00 to 48.00
Grate bars	43.00 to 44.00
Brake shoes	45.00 to 46.00
Malleable	63.00 to 64.00
Cast iron car wheels	46.00 to 47.00
No. 1 machinery cast.	46.00 to 47.00
Hvy. breakable cast.	39.00 to 40.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	37.00 to 38.00
No. 2 bundles	37.00 to 38.00
No. 1 busheling	37.00 to 38.00
Long turnings	23.00 to 24.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	24.00 to 25.00
Bar crops and plate	38.00 to 38.50
Structural and plate	38.00 to 38.50
No. 1 cupola cast.	46.00 to 47.00
Stove plate	43.00 to 44.00
No. 1 RR. hvy. melt.	36.00 to 37.00
Steel axles	38.00 to 39.00
Scrap rails	37.50 to 38.00
Rerolling rails	48.00 to 49.00
Angles & splice bars	40.00 to 41.00
Rails 3 ft. & under	40.00 to 41.00
Cast iron carwheels	35.00 to 36.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.50 to $43.00
No. 2 hvy. melting	42.50 to 43.00
Mach. shop turn.	36.00 to 36.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos	46.00 to 46.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$39.00
No. 2 hvy. melting	39.00
No. 2 bundles	39.00
Comp. galv. bundles	37.00
Mach. shop turn.	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	43.50 to 44.00
Hvy. breakable cast.	43.50 to 44.00
Charging box cast.	43.50 to 44.00
Stove plate	43.50 to 44.00
Clean auto cast.	43.50 to 44.00
Unstrip. motor blks.	40.50 to 41.50
Cl'n chem. cast bor.	33.50 to 34.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	39.00 to 40.00
Mach. shop turn.	32.50 to 33.50
Shoveling turn.	34.50 to 35.50
Cast iron borings	31.50 to 32.50
Mixed bor. & turn.	31.50 to 32.50
No. 1 cupola cast.	45.00 to 47.00
Charging box cast.	41.00 to 43.00
Stove plate	44.00 to 45.00
Clean auto cast.	43.00 to 45.00
RR. Malleable	60.00 to 65.00
Small indl. malleable	45.00 to 47.00
Low phos. plate	44.00 to 45.00
Scrap rails	47.00 to 48.00
Rails 3 ft. & under	50.00 to 52.00
RR. steel wheels	46.00 to 48.00
Cast iron carwheels	46.00 to 48.00
RR. coil & leaf spgs.	46.00 to 48.00
RR. knuckles & coup.	46.00 to 48.00

CLEVELAND

Per gross ton delivered to consumer:†

No. 1 hvy. melting	$39.50 to $42.50
No. 2 hvy. melting	39.50 to 42.50
No. 1 bundles	39.50 to 42.50
No. 2 bundles	39.50 to 42.50
No. 1 busheling	39.50 to 42.50
Drop forge flashings	39.50 to 42.50
Mach. shop turn.	35.50 to 36.00
Shoveling turn.	36.00 to 36.50
Steel axle turn.	39.00 to 42.50
Cast iron borings	36.00 to 36.50
Mixed bor. & turn.	36.00 to 36.50
Low phos.	43.00 to 43.50
No. 1 machinery cast.	58.00 to 60.00
Malleable	60.00 to 65.00
RR. cast.	58.00 to 60.00
Railroad grate bars	48.00 to 52.00
Stove plate	48.00 to 50.00
RR. hvy. melting	40.50 to 41.00
Rails 3 ft. & under	56.00 to 58.00
Rails 18 in. & under	58.00 to 60.00

†See box on this page.

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 2 bales	25.00

Per gross ton delivered to consumer:

No. 3 bales	$19.50
Mach. shop turn.	16.00
Elec. furn. 1 ft. und	$32.00 to 34.00
No. 1 cupola cast.	32.00 to 33.00
RR. hvy. melting	26.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$25.50
No. 2 hvy. melting	25.50
No. 1 bales	25.50
No. 2 bales	25.50
No. 3 bales	19.50
Mach. shop turn.	17.50
No. 1 cupola cast.	$36.00 to 40.00
RR. hvy. melting	26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$24.00
Elec. furn. 1 ft. and und.	27.50
No. 1 cupola cast.	27.50
RR. hvy. melting	25.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact., prep'd	21.00*
Bushelings, new fact., unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	36.00 to 40.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-rolled Steel: (cents per pound)	Nov. 18, 1947	Nov. 11, 1947	Oct. 21, 1947	Nov. 19, 1946
Hot-rolled sheets	2.80	2.80	2.80	2.425
Cold-rolled sheets	3.55	3.55	3.55	3.275
Galvanized sheets (10 ga.)	3.95	3.95	3.95	4.05*
Hot-rolled strip	2.80	2.80	2.80	2.45
Cold-rolled strip	3.55	3.55	3.55	3.05
Plates	2.95	2.95	2.95	2.50
Plates wrought iron	6.85	6.85	6.85	4.112
Stain's c-r strip (No. 302) *24 gage	30.50	30.50	30.50	30.30
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.50
Cold-finished bars	3.55	3.55	3.55	3.10
Alloy bars	3.30	3.30	3.30	2.92
Structural shapes	2.80	2.80	2.80	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	25.97
Wrought iron bars	7.15	7.15	7.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.05
Wire nails	4.25	4.25	4.25	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$43.39*
Light rails	3.10	3.10	3.10	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00	$45.00	$45.00	$39.00
Sheet bars	66.00	66.00	66.00	38.00
Slabs, rerolling	45.00	45.00	45.00	39.00
Forging Billets	55.00	55.00	55.00	47.00
Alloy blooms, billets slabs	66.00	66.00	66.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.30
Skelp	2.60	2.60	2.60	2.05

Pig Iron: (per gross ton)	Nov. 18, 1947	Nov. 11, 1947	Oct. 21, 1947	Nov. 19, 1946
No. 2, foundry, Phila.	$40.97	$40.97	$41.36	$30.43
No. 2, Valley furnace	36.50	36.50	36.50	28.50
No. 2, Southern Cin'ti	40.24	40.24	40.24	27.80
No. 2, Birmingham	34.88	34.88	34.88	24.88
No. 2, foundry, Chicago†	36.00	36.00	36.00	28.50
Basic del'd Philadelphia	40.47	40.47	40.86	29.93
Basic, Valley furnace	36.00	36.00	36.00	28.00
Malleable, Chicago†	36.50	36.50	36.50	28.50
Malleable, Valley	36.50	36.50	36.50	28.50
Charcoal, Chicago	56.04	56.04	50.04	42.34
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$42.50	$42.50	$42.25	$25.25
Heavy melt'g steel, Phila.	42.50	42.50	41.50	24.50
Heavy melt'g steel, Ch'go	38.75	39.50	41.75	24.50
No. 1, hy. comp. sheet, Det.	34.75	34.75	37.25	22.32
Low phos. Youngs'n	46.25	46.25	46.25	27.75
No. 1, cast, Pittsburgh	48.50	49.50	45.50	29.00
No. 1, cast, Philadelphia	53.00	53.00	51.50	39.00
No. 1, cast, Chicago	52.50	53.50	52.50	37.75
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$8.75
Foundry coke, prompt	14.00	14.00	14.00	8.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	17.50
Copper, Lake, Conn.	21.625	21.625	21.625	17.50
Tin, Straits, New York	80.00	80.00	80.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	11.65
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	23.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 18, 1947	3.18925¢ per lb.	$36.96 per gross ton.	$41.25 per gross ton.
One week ago	3.18925¢ per lb.	$37.06 per gross ton.	$41.50 per gross ton.
One month ago	3.18925¢ per lb.	$36.96 per gross ton.	$41.83 per gross ton.
One year ago	2.70711¢ per lb.	$28.13 per gross ton.	$19.17 per gross ton.

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1947	3.18925¢ Aug. 12	2.87118¢ Jan. 7	$37.35 Aug. 10	$30.14 Jan. 7	$42.58 Oct. 28	$29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over, (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: includes 3 pct freight tax. (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Spot market as high as $92 gross ton or higher. (17) Delivered Los Angeles: add ½¢ per 100 lb for San Francisco. (18) Slab prices subject to negotiation in most cases. Some producers charge (19) $2 more, (21) $1 more. Some producers charge (22) 0.05¢ less, (23) 0.10¢ less, (24) 0.20¢ less.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($36.00 f. o. b. mill) (Spot market as high as $80 gross ton)														
Carbon, forging	$46.00														
Alloy	$56.00									(Canton = $56.00)					
BILLETS, BLOOMS, SLABS															
Carbon, rerolling [18]	$45.00[19]	$45.00[19]	$45.00[19]	$47.00	$45.00[19]	$45.00[19]							$48.00[19]		
Carbon, forging billets	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00							$58.00		
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton = $66.00)						$69.00		
SHEET BARS[16]							$66.00								
PIPE SKELP	2.60¢[21]	2.65¢					2.60¢[21]								
WIRE RODS	2.80¢[21]	2.80¢[21]		2.80¢[21]	2.85¢		(Worcester = 2.90¢[21])					3.52¢[13]			
SHEETS															
Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	3.175¢	(Ashland, Ky. = 2.80¢)		3.54[17]¢	2.95¢	3.12¢	3.02¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.70¢	4.00¢	3.97¢
Galvanized (10 gage)	3.95¢[23]	3.95¢[23]	3.95¢[23]		3.95¢[23]		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢[17]		4.27¢	4.17¢
Enameling (12 gage)	3.95¢[22]	3.95¢[22]	3.95¢[22]	3.95¢			3.95¢		4.05¢	3.95¢			4.10¢[22]	4.42¢	4.37¢
Long ternes [2] (10 gage)	4.05¢[24]	4.05¢[24]	3.85¢											4.52¢	4.47¢
STRIP															
Hot-rolled [3]	2.80¢	2.80¢	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[17]	2.95¢	3.27¢	3.22¢
Cold-rolled [4]	3.55¢	3.65¢		3.55¢			3.55¢			(Worcester = 3.75¢)			3.70¢	4.02¢	3.97¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.57¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85	(Warren, Ohio = $5.75)				$6.175	$6.074
Electro, box 0.25 lb.	Deduct 90¢ from standard coke base box price.														
Electro, box 0.50 lb.	Deduct 70¢ from standard coke base box price.														
Electro, box 0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.90¢	3.90¢	3.90¢		4.00¢			4.00¢	4.00¢					4.32¢	4.22¢
BLACKPLATE, CANMAKING															
55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.825[17]¢	3.05¢	3.35¢	3.32¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325[17]¢		3.07¢	2.97¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.70¢	4.00¢	3.97¢
Alloy, hot-rolled	3.30¢	3.30¢				3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)					3.45¢		3.45¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢							4.25¢		
PLATE															
Carbon steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville = 3.15¢, Claymont = 3.15¢, Geneva, Utah = 3.10¢) 2.95¢				3.76¢[14]		3.27¢	3.17¢
Floor plates	4.20¢	4.20¢												4.67¢	4.62¢
Alloy	3.80¢	3.80¢			(Coatesville = 4.50¢)									4.27¢	4.22¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 3.95¢, Bethlehem = 2.80¢)					3.43¢[10]		3.02¢	2.95¢
SPRING STEEL, C-R															
0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester = 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester = 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester = 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester = 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester = 9.65¢)								
MANUFACTURERS' WIRE[9]															
Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56[13]¢		3.99¢	3.97¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.60¢	4.60¢		4.60¢	(Worcester = 4.70¢, Duluth = 4.85¢) (Trenton = 4.85¢)							5.28¢[13]		5.04¢	4.96¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.75¢	3.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi Canton, Phila, Reading, Ft. Wayne, Balt	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton Youngstown	32.50	30.50	24.00	24.50	35.00	58.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.76
Tubing, seamless, P'gh, Chi, Canton (4 to 6 in.)	72.09	72.09	....	68.49	....	....

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. •Also Canton, Ohio)

W	Cr	V	Mo	Co	Base Per lb
18	4	1	—	—	82¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium•	47¢
Oil hardening manganese•	26¢
Special carbon•	24¢
Extra carbon•	20¢
Regular carbon•	17¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.50¢
Armature	4.80¢
Electrical	5.30¢
Motor	6.05¢
Dynamo	6.75¢
Transformer 72	7.25¢
Transformer 65	7.95¢
Transformer 58	8.65¢
Transformer 52	9.45¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.75
Angle splice bars, 100 lb	3.25
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$3.10
Light rails (from rail steel), f.o.b. Williamsport, Pa.	3.45

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.05¢
Tie plates, Pittsburg, Calif.	3.20¢
Track bolts	7.00¢
Track bolts, heat treated, to rail roads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo.; Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	•24.00	•22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

• Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard & coated nails	$4.25†	$5.3[illegible]
Galvanized nails‡‡	4.00†	5.0[illegible]
Cut nails, carloads, Pittsburgh base	5.30•	....

† 10¢ additional at Cleveland, 35¢ at Worcester. ‡‡ Plus $2.75 per 100 lb galvanizing extra. •Less 20¢ to jobbers.

	Base per 100 lb	
Annealed fence wire	$4.20‡	$5.1[illegible]
Annealed galv. fence wire	4.65‡	5.6[illegible]

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence•	91	114
Fence posts, carloads	90††	..
Single loop bale ties	91	115
Galvanized barbed wire••	101	121
Twisted barbless wire	101	...

• 15½ gage and heavier. •• On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	5.30	5.30	5.30	5.30	5.30
Galvanized	....	5.85	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	....	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Cold-rolled	....	....	....	....	....	....	....	....	....
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
½-in.	50½	34½
¾-in.	53½	38½
1-in.	56	41½
1¼-in.	56½	42
1½-in.	57	42½
2 in.	57½	43
2½ and 3-in.	58	43½
Wrought Iron, buttweld		
⅛-in.	+ 7	+29
¼-in.	2½	+19
⅜ and ½-in.	8	+11
¾-in.	13½	+ 7½
1-in.	14	+ 7
Steel, lapweld		
2-in.	49	34
2½ and 3-in.	52	37
3½ to 6-in.	54	39
Steel, seamless		
2-in.	48	33
2½ and 3-in.	51	36
3½ to 6-in.	53	38
Wrought Iron, lapweld		
2-in.	5½	+14½
2½ to 3½-in.	8	+10½
4-in.	12	+ 5
4½ to 8-in.	10	+ 6½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	49½	35
¼-in.	53½	39
⅜-in.	55½	42
½-in.	56	42½
¾-in.	56½	43
1-in.	57	43½
1¼-in.	57½	44
Wrought Iron, buttweld		
⅛-in.	+ 2½	+23
¼-in.	3½	+17
⅜ to 2-in.	13	+ 7
Steel, lapweld		
2-in.	48	34
2½ and 3-in.	52	38
3½ to 6-in.	55½	41½
Steel, seamless		
2-in.	47	33
2½ and 3-in.	51	37
3½ to 6-in.	54½	40½
Wrought Iron, lapweld		
2-in.	8½	+11
2½ to 4-in.	17½	+ ½
4½ to 6-in.	13	+ 5

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$16.67	$19.99	$16.17	$19.39
2½	12	22.42	26.87	21.75	26.06
3	12	24.93	29.90	24.18	29.00
3½	11	31.17	37.39	30.23	36.27
4	10	38.69	46.38	37.53	44.99

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago $86.12
6-in. to 24-in. del'd New York..... 84.18
6-in. to 24-in., Birmingham 74.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less 100.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Percent Off List
½ in. & smaller x 6 in. & shorter..	45
9/16 & ⅝ in. x 6 in. & shorter.....	46
¾ in. & larger x 6 in. & shorter....	43
All diam, longer than 6 in.	41
Lag, all diam over 6 in. long.....	44
Lag, all diam x 6 in. & shorter.....	46
Plow bolts	54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	43
9/16 to 1 in. inclusive	42
1⅛ to 1½ in. inclusive	40
1⅝ in. and larger	35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts

	USS	SAE
7/16 in. and smaller		46
½ in. and smaller	44	..
½ in. through 1 in.		44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in. ..	41	42
1⅝ in and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate .... 65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets *(½ in. and larger)*

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets *(7/16 in. and smaller)*

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages)	*Percent Off List*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	53
¾ to 1 in. x 6 in., SAE 1035, heat treated	44
Set screws, cup and oval points	57
Milled studs	31
Flat head cap screws, listed sizes..	16
Fillister head cap, listed sizes.....	37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh.....24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh .....30¢ to 31½¢
Copper, reduced, 150 and 200 mesh .....29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots....10¢ to 17¢
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags..7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots ..... 8¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots .....63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe .....35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe.... 29¢ to 32¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe.....90¢ to $1.75
Aluminum, 100, 200 mesh, carlots .....23¢ to 26¢
Antimony, 100 mesh ..... 36.05¢
Cadmium, 100 mesh $2.00
Chromium, 100 mesh and finer.... $1.02
Lead, 100, 200, & 300 mesh 18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser ..... 49¢
Nickel, 100 mesh ..... 51½¢
Silicon, 100 mesh ..... 24¢
Solder powder, 100 mesh..3½¢ plus metal
Stainless steel, 302, minus 100 mesh...75¢
Tin, 100 mesh ..... 90¢
Tungsten metal powder, 98%-99%, any quantity, per lb..... $3.05
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb. $2.65
Under 100 lb $2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$12.00 to $13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	$17.10
Chicago, f.o.b.	16.10
New England, del'd	19.75
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, del'd	17.83
Swedeland, Pa., f.o.b.	16.90
Buffalo, del'd	18.75
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	16.75
Cleveland, del'd	17.90
Cincinnati, del'd	18.59
St. Louis, del'd	18.03
Birmingham, del'd	15.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
No. 1, Ohio	$64.00
First quality, Pa., Md., Ky., Mo., Ohio	70.00
First quality, New Jersey	75.00
Sec. quality, Pa., Md., Ky., Mo, Ohio	64.00
Sec. quality, New Jersey	59.00
No. 2, Ohio	56.00
Ground fire clay, net ton, bulk....	10.00

Silica Brick

Pennsylvania and Birmingham ...	$70.00
Chicago District and Alabama	79.00
Silica cement, net ton (Eastern)...	12.00
East Chicago	13.00

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester $59.00

Magnesite Brick

Standard, Balt. and Chester $81.00
Chemically bonded, Baltimore 70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk $44.50
Domestic, f.o.b. Chewelah, Wash., in bulk 24.00
in sacks 28.00

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest; add 10¢; Missouri Valley; add 20¢..$11.05

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.47	$5.73	$5.82	$4.78	$5.68	$4.82	$4.55	$4.83	$5.53	$8.34	$8.44	$9.88	$9.95
New York	4.71	5.72[1]	6.11	5.03	5.86	5.06	4.75	5.02	5.57	8.40	8.50	9.92	10.02
Boston	4.76	5.63[12]	6.16[12]	4.76	6.73	5.11	4.82	4.98	5.63	8.62	8.72	9.98	10.08
Baltimore	4.31	....	5.56	4.76	....	4.76	4.68	4.81	5.51	....	....	....	....
Norfolk	4.80	....	....	5.20	....	5.05	5.05	5.10	5.90	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
Milwaukee	4.423	5.279[1]	5.829	4.523	5.623[5]	4.779	4.579	4.573	5.279	8.373	8.473	9.623	9.723
Cleveland	4.25‖	4.95	5.78	4.52	5.00	4.60†	4.65	4.40	5.10	8.33	8.43	9.30	9.49
Buffalo	4.25	5.10	6.00	4.70	5.65[5]	4.95	4.40‡	4.40‡	5.10	8.05	8.15	9.30	9.40
Detroit	4.35	5.20	6.02	4.72	5.63	4.88†	4.77	4.50	5.22	8.50	8.60	9.73	9.78
Cincinnati	4.51	5.19	5.74	4.74	5.70	4.95	4.79	4.75	5.45	....	....	....	....
St. Louis	4.58	5.43[1]	5.87	4.68	5.82	4.88	4.73	4.73	5.47	8.57	8.67	9.82	9.92
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.05	8.15	9.30	9.40
St. Paul	4.63	5.48[1]	5.88[2]	4.73[7]	....	4.93[7]	4.78[7]	4.78[7]	5.91[6]	....	....	....	....
Omaha	4.868	6.118[1]	6.468	5.168	....	5.418	5.218	5.218	5.918	....	....	....	....
Indianapolis	4.51	5.29	5.84	4.61	5.48	4.86	4.66	4.65	5.36	....	....	....	....
Birmingham	4.45[11]	....	5.65	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.04	....	....	....	....
Memphis	4.82[11]	5.87	6.37	5.02[11]	....	5.17[11]	4.97[11]	4.97[11]	6.12	....	....	....	....
New Orleans	*4.98[11]	6.29[1]	....	5.18[11]	....	5.33[11]	*5.03[11]	*5.13[11]	6.29[6]	....	....	....	....
Houston	5.30	....	6.60	5.25	....	5.35	5.15	5.30	6.80	9.40[17]	9.20[17]	10.35[17]	10.45[17]
Los Angeles	5.75	7.35[1]	7.40	6.05	8.70[5]	5.55	5.35	5.50	7.35[14]	9.55[15]	9.35[15]	10.95[15]	11.05[15]
San Francisco	5.40[8]	6.65	6.85	5.75[8]	....	5.50	5.20	5.05	7.50[10]	9.55[15]	9.35[15]	10.95[15]	11.05[15]
Seattle	5.45[4]	7.25[2]	6.85	5.60[4]	....	5.60[4]	5.25[4]	5.45[4]	7.45[14]	....	9.75[6]	....	11.10[6]
Portland	5.30[4]	7.10[2]	6.70	5.60[4]	....	5.45[4]	5.25[4]	5.55[4]	7.45[14]	....	....	....	....
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 450 to 1499 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) 1000 to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

‡ Add 35¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	37.00	37.50	38.00	38.50	.....	Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	.....
Birmingham	32.88-35.88	33.38-38.38	.....	.....	.....	Boston	Steelton	5 30	.....	.....	.....	.....	47.30
Buffalo	38.00-39.50*	38.00-40.00*	38.50-40.50*	.....	.....	Brooklyn	Bethlehem	3.30	40 30	40.80	41.30	41.80	.....
Chicago	35.50	38.00	36.50	37.00	.....	Cincinnati	Birmingham	5 38	38 24-41 25	38 74-41.74	.....	.....	.....
Cleveland	35 50-40.75*	38.00-41.25	38 50-41.75*	.....	.....	Jersey City	Bethlehem	2 02	39 02	39 52	40.02	40.52	.....
Duluth	36.00	38.50	37.00	37.50	.....	Los Angeles	Provo	6 53	42 53	43.03	.....	.....	.....
Erie	35.50	38.00	36.50	37.00	.....	Mansfield	Cleveland-Toledo	2.56	38 06-43 31*	38 56-43.81*	39 06-44 31*	39.56	.....
Everett	.....	45.00	45.50	.....	.....	Philadelphia	Bethlehem	1 84	38 84	39 34	39.84	40.34	.....
Granite City	36.50	37.00	37.00	.....	.....	Philadelphia	Swedeland	1.11	42 11	42.61	43.11	43.61	.....
Neville Island	36.00	38.50	36.50	37.00	.....	Philadelphia	Steelton	2 38	39 38	.....	.....	.....	44.38
Provo	36 00	36.50	.....	.....	.....	San Francisco	Provo	6 53	42 53	43 03	.....	.....	.....
Sharpsville	36.00	36.50	36.50	37.00	.....	Seattle	Provo	6 53	42 53	43.03	.....	.....	.....
Steelton	37.00	.....	.....	.....	42.00	St. Louis	Granite City	0.75 Arb.	37.25	37.75	37.75	.....	.....
Struthers, Ohio	36.50	.....	.....	.....	.....								
Swedeland	41.00	41.50	42.00	42.50	.....								
Toledo	35.50	36.00	36.50	37.00	.....								
Troy, N. Y.	37.00	37.50	38.00	38.50	42.00								
Youngstown	36.00	36.50	36.50	37.00	.....								

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$45.50; f.o.b. Buffalo—$46.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $50.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $56.04. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk) $145
Less ton lots (packed) **172.00**
Delivered Pittsburgh 151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk ...	8.00	8.25	8.50
Ton lots	9.00	9.60	11.50
Less ton lots ...	9.40	10.00	11.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$46.00	$47.00
F.o.b Pittsburgh	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk 32
L.c.l. lots 34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads 32
Ton lots 34
Less ton lots 36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C. 0.06% P, 90% Mn	23.00	24.10	24.70
0.10% max. C	22.50	23.60	24.20
0.15% max. C	22.00	23.10	23.70
0.30% max. C	21.50	22.60	23.20
0.50% max. C	21.00	22.10	22.70
0.75% max. C, 7.00% max. Si.....	18.00	19.10	19.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk 7.40
Ton lots 8.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet 7.65
Ton lots 8.65
Less ton lots 9.05

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $73.00 f.o.b. Keokuk, Iowa; $73.75 f.o.b. Niagara Falls; $70.75, f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe..	18.50	19.85	21.60
97% Si, 1% Fe..	18.00	20.25	22.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk ..	4.80	5.05	5.25
Ton lots	5.80	6.40	6.70
Less ton lots ...	6.20	6.80	7.10

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	8.80	9.30	9.50
75% Si	11.20	11.50	12.25
80-90% Si	12.70	13.00	13.75
90-95% Si	14.35	14.65	15.35

Ferrochrome (65-72%Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	25.00	25.40	26.00
0.10% C	24.50	24.90	25.50
0.15% C	24.00	24.40	25.00
0.20% C	23.75	24.15	24.25
0.50% C	23.50	23.90	24.00
1.00% C	23.00	23.40	23.50
2.00% C	22.50	22.90	23.00
65-69% Cr, 4.9% C	17.60	18.00	18.15
62-66% Cr. 4-6% C. 6-9% Si.	18.60	19.00	19.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk ...	11.10	11.35	11.45
Ton lots	12.00	12.90	13.50
Less ton lots ..	12.40	13.30	13.90

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	18.70	19.10	19.25
Ton lots	19.90	21.20	22.00
Less ton lots ...	20.60	21.90	22.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	23.00	23.40	23.50
Ton lots	24.35	25.00	26.20
Less ton lots ...	25.35	26.00	27.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C..	91.00	92.50	93.75
0.50% max. C...	87.00	88.50	89.75
9.00% min. C ...	87.50	89.00	91.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.35	20.50
Less ton lots ...	18.60	19.35	21.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	16.75	17.25	19.30
Ton lots	18.85	19.70	21.45
Less ton lots ...	19.85	20.70	22.45

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70	$3.40
Less ton lots ...	2.20	3.05	4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr. 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	17.25	18.35	20.30
Less ton lots ...	18.00	19.10	21.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.05	16.15	18.10
Less ton lots ...	15.80	16.90	18.85

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed.. $2.56

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)..	3.10

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5 $1.34

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb

Ton lots	$2.50
Less ton lots	$2.55

Ferromolybdenum, 55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo. ..... 98¢

Calcium molybdate, 40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo. ..... 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo..... 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo..... 80¢

Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti $1.22
Less ton lots $1.31

Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti $1.35
Less ton lots $1.40

High carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton.... $142.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton $65.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Carload lots ..... 18.40¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy
Carload, bulk ..... 6.00¢

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.
Carload ..... 6.90¢
Ton lots ..... 7.40¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Car lots ..... 9.00¢
Ton lots ..... 9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots..	$1.30	$1.3075	$1.339

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots ...	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots..	$1.80	$1.8125	$1.8445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.
Carload lots ..... 37.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed on 50 lb and over

No. 1	93¢
No. 6	63¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls
Ton lots, per pound ..... 45¢
Less ton lots, per pound.... 50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%.
Ton lots, per pound ..... 8.0¢